

Evaluating the network's value creation and its dependence on absorptive capacity and social capital factors

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Abstract

Networks are assumed to enhance small firms' performance and competitiveness. Research indicates that there are various sources of value that could derive from networks, such as cost and time efficiency, quality improvement, flexibility and innovation. However, in most cases these values are associated with a general framework of what Information Communication Technologies (ICT) and network models are supposed to offer to small and medium enterprises (SMEs) and their participating actors. Little empirical research has focused on the real value that participating firms can appropriate and create. Based on an empirical study involving SMEs, this paper analyses the value that SMEs can create and/or appropriate by participating in networks and the extent to which value creation depends on factors such as absorptive capacity and social capital. This study demonstrates that SMEs can create and appropriate a great deal of value when they become an integral part of network systems. However, factors such as absorptive capacity and social capital need to be taken into consideration, since they greatly impact and affect the capability of firms to create and appropriate value. It is argued that in order to create and appropriate value through networks, they need to emphasize knowledge assimilation and sharing as well as creating continuous learning capability.

Keywords: value creation, networks, SMEs, social capital, absorptive capacity

1. Introduction

A number of factors are transforming the rules of competition for established businesses in unprecedented ways. These factors include globalization, technological development and the increasingly rapid diffusion of new technologies and innovation. A new competitive landscape has emerged where the barriers of time and space are increasingly being abolished and new business models are being created. Change is the only constant today, and it is related to and heavily dependent on the dynamic capability of a firm or a country. Dynamic capability is defined as: "the ability to sense and then to seize the new opportunities, to reconfigure and to protect knowledge assets, competences, complementary assets and technologies to achieve sustainable competitive advantage," (Teece, Pisano, Shuen, 1997, p 12).

Rapid developments and technological changes introduce both opportunities and threats for traditional enterprises. Firms encounter substantial strategic discontinuities, unpredictable environment changes and dynamic uncertainty, which can be daunting for many companies. Small and medium enterprises (SMEs) are most threatened by this situation; they face many barriers and problems to embracing new business models and innovative changes, such as lack of skilled workers, research and development

(R&D) deficiencies, lack of financial resources for information technology (IT) investments, disadvantages of small size, inadequate management style, high costs and the complexity and risk of innovation. They cannot find all the knowledge, information and resources they need in-house or even within the borders of their own country. An underlying assumption in SME literature is that networks and clusters are remarkably important for SMEs, since by accessing and utilising external resources in the network they can overcome some of their disadvantages (Meyer-Stamer, 1998, Nadvi and Schmitz, 1997).

A growing body of literature focusing on different industrial sectors and large and small firms sees networking and collaborative practices as a viable method of knowledge creation and transfer (Hamel, 1991, Nonaka, 1994, Powell, Koput, Smith-Doerr, 1996) and therefore as the new model for value creation and competitive advantage in the knowledge-based economy. However, due to the advent of virtual markets and the impact of information and communication technologies (ICTs), the current paradigm shift from value chains to value networks emphasises that the new source of value creation lies in networks of firms (Bettis, 1998; Dyer and Nobeoka, 2000; Gulati, Nohria, Zaheer, 2000). This requires a network of capabilities drawn from multiple stakeholders including customers, suppliers and partners.

In order for SMEs to compete in the new global market, they should be organised according to the new emerging models, rules, policies and strategies. New forms of networking and collaboration between industry actors, which facilitate collective learning and innovation, are essential. There is evidence that various kinds of advantages and values can derive from networking. It is argued that networks can help firms to create value through close inter-firm collaboration and co-opetition and through the access they could have to complimentary assets and competencies residing in other firms (Pyke, Beccattini and Sengenberger, 1990, Sengenberger, Loveman, and Piore, 1990).

However, the process by which firms create value inside networks has not been given much attention. Moran and Ghoshal (1999) have developed a framework that describes value creation as a process comprising resource combination and exchanges, where organisations and businesses interact with markets to create economic value for themselves, for their members and for the society. They argue that value creation depends much more on the ability of firms to access, deploy, exchange and combine resources (Moran and Ghoshal, 1999).

This is in line with the relational view, which recognises that networks have a greater potential to create distinctive, difficult-to-imitate resources than single firms in isolation (Gulati and Gargiulo, 1999). By building relation-specific assets, knowledge-sharing routines and effective relational governance mechanisms into relationships, firms can leverage their relational resources for knowledge acquisition and exploitation. During this process social capital plays an important role in network creation (it is a necessary condition) and in long-term success, since it greatly affects the value creation process of firms.

On the other hand, the participation of firms in a network doesn't automatically mean value creation for them. The value creation of firms depends largely on their capabilities to capture and absorb the value created inside the network and on the relationships between firms, customers and suppliers. Although firms have access to network resources, such as information, knowledge, capital, goods and services, they are unable to appropriate benefits without the absorptive capabilities which allow them to alter, integrate and recombine their resource bases to generate new value-creating strategies (Grant, 1996, Pisano, 1994). Accordingly, networks offer major opportunities for firms to create value; due to interactions that can take place within a firm and between firms, they can access knowledge and resources outside their boundaries. However, the extent to which they can create and appropriate value depends on the magnitude of the absorptive capacity of and social interaction between the participating firms.

It is the aim of this paper to examine and to provide empirical evidence regarding the value that single SMEs could appropriate and create from participating in network systems. It also examines to what extent the value creation and appropriation depends on the firms' absorptive capacity and social interaction. The following sections present the theoretical framework on which the hypothesis is based. The second section presents the methodology used for conducting the empirical research and for testing the hypothesis. The final sections discuss the main findings of the empirical research.

2. Review of concepts and hypotheses

This section contains the literature review regarding value creation and absorptive capacity constructs; it also presents the main hypotheses analysed in this study.

Value creation

In this paper we have adopted an evolutive view of "value" that incorporates and taps into the intangible aspects of value. In traditional industrial organisations, economic value is defined in economic or monetary terms and is expressed in terms of financial metrics. The value chain framework of Porter (1985) was the conceptual foundation to explain this type of value. According to this framework, value is analysed at the firm level and is added step-by-step to the firm's core activities. However, despite the powerful insights and assumptions this framework provides, it has been criticised, mainly by "resource-based view" authors (Barney, 1991). They criticise its focus on the issues of value appropriation and distribution rather than on the issues of value creation (creation of new rent sources) (Moran and Ghoshal, 1999).

More recent changes, in particular the awareness about the relevance and the role of intellectual capital and intangible assets, have extended the perspectives to explain value creation and sources. Several authors (Norman and Ramirez, 1993; Allee, 2000) have criticised the traditional mechanistic view of value, which is expressed mainly in monetary terms, and have suggested redefining "value" in accordance with the intangibles perspective and viewing it as a dynamic and organic system. In the new conceptualisation, "value" is defined as a tangible or intangible good – or service, knowledge or benefit – that is desirable or useful to its recipients so that they are willing to pay a fair price for it (Allee, 2000). This broader way of defining and approaching value shifts us toward systems thinking and allows us to appreciate differences and diversities, rather than being constrained by the conformity of the financial measures alone (Allee, 2000).

From this perspective, the value creation processes expands to include the new value sources. The extended perspective of value is in accordance with the resource-based view (RBV) of the firm, which sees firms as a collection of resources bound together in an administrative framework (Penrose, 1959). RBV recognises that firms differ largely and sustainably in their resource endowments (Rumelt, 1984; Grant, 1991). The value creation is a result of different combinations of resources which can create new sources of value by creating new goods, new methods, new markets or new supply sources.

By taking this view, Amit and Zott (2001) found that value creation could be expressed in terms of four main components (Table 1): Efficiency, Complementarities, Novelty and Lock in. They based their findings and analysis on in-depth empirical research and on a very careful review of the main theoretical views of value creation. These views included Porter's value chain framework (1985), Schumpeter's theory of creative destruction (1934), the resource-based view of the firm (Barney, 1991; Penrose, 1959), Strategic network theory (Dyer and Singh, 1998; Gulati, 1999) and Transaction costs of economics (Coase, 1937, Williamson, 1975). A brief description of each component is provided below.

Efficiency

Networks of firms provide access to resources, information, knowledge etc, which contributes to the firms' transaction efficiency by reducing information asymmetry. Network ties are important sources of referrals that enable prospective

partners to identify and learn about each other's capabilities. Improved information also reduces customers' search costs as well as opportunistic behaviour (Williamson, 1975). Efficiency is also attained by streamlining inventory management and the supply chain, by scale economies through demand aggregation, by enabling faster and more informed decision making and by speeding up transaction processing. Social structures embedded in inter-firm relationships enable firms to work closely together without the need for costly formal hierarchical controls (Gulati and Singh, 1999).

Novelty

This component is related to new production methods, the creation of new markets, the discovery of new supply sources, the reorganisation of the industry etc. Organisations learn and create innovations through knowledge communication and combination (Kogut and Zander, 1992). New combinations are created by establishing novel associations between existing knowledge (Cohen and Levinthal, 1990); effective communication enhances the potential for creating such associations (Dyer and Singh, 1998). The locus of innovation is found in a network of interorganisational relationships (Zajac and Olsen, 1993; Powell, Kogut and Smith-Doerr, 1996). Interorganisational relationships, which allow firms to access other firm's resources, increase the possibility of firms to acquire new knowledge and as result to develop new products, services, new distribution and production methods etc.

Table 1. Value creation literature.

Variables	Definition and Items	Literature
Efficiency	Reduced transaction costs, streamlined inventory management, scale economies, faster and more informed decision making and accelerated transaction processing.	Williamson, 1975; Dyer and Singh, 1998; Amit and Zott, 2001; Gulati and Singh, 1999;
Novelty	New services, products, information and combinations created by novel associations between new and existing knowledge and by effective communication and coordination of different actors.	Cohen and Levinthal, 1990; Dyer and Singh, 1998; Schumpeter, 1934;; Amit and Zott, 2001.
Lock-in	The extent to which customers are motivated to engage in repeated transactions; a high customer satisfaction level resulting from effective customer relationship management, personalised solutions and intimate knowledge.	Tiwana, 2000; Amit and Zott, 2001.
Complementarities	Complementary goods and services that proved added value to customers.	Brandenburger and Nelebuff, 1996; Gulati, 1999; Amit and Zott, 2001.

Lock-in

Building customer lock-ins requires the delivery of three facets: knowledge, anticipation of future requirements and superior communication (Tiwana, 2001). It prevents the migration of customers and strategic partners to competitors, thus creating value. Virtual networks allow the creation of virtual communities that enable frequent interactions on a wide range of topics, thus creating a positive feedback loop, increasing loyalty level and enhancing transaction frequency (Amit and Zott, 2001). An important characteristic of networks is the externalities they create. Network relationships means exposure to a diversity of knowledge content which, as Zahra *et al* (2000) argue, increases the depth, breadth and speed of learning, thus leading to new product improvements, new functional requirements, product personalisation and customisation. This also enhances loyalty and transaction frequency.

Complementarities

Network theory also highlights the importance of complementarities among the participants in a network (Gulati, 1999). Complementarities involve the synergy of knowledge not achievable by any single participant on their own. Most firms approach collaboration from a complementary view, to have access to specialised knowledge they lack (Grant, 1991). Efficiency gains made possible by information technology pave the way for the orchestration and profitable exploitation of complementarities among network participants. As a result, in a virtual network the possibility to access complementary resources is greater. Interorganisational relationships are a viable option for the creation of a sustained competitive advantage through idiosyncratic, yet complementary, resource combinations (Kogut, 1991, Kogut and Zander, 1992). Adapting Amit and Zott's framework of value creation sources, and consistent with the literature about networks, it is hypothesized that:

Hypothesis 1: A network approach could enhance the firm's potential of value creation by:

- a: offering advantages of costs reduction and operational efficiency, thus improving the firm's efficiency.
- b: facilitating learning, knowledge sharing and creation of new products/services, thus positively influencing the learning and innovation processes.
- c: allowing firms to offer higher quality and more customised products as well as to promote trust and loyalty with customers, thus creating lock-in value.
- d: allowing firms access to a diversified array of information, resources, markets and technologies, thus providing complementary assets.

Factors impacting value creation and appropriation

Absorptive capacity (AC)

The extent to which firms participating in networks can create and appropriate value depends on the intensity of relations and interactions among network firms as well as on their individual capabilities to capture and absorb the value created inside the network.

Industry observers have remarked that companies can accumulate a large stock of valuable technology assets and still not have useful capabilities. Lane and Lubatkin (1998) indicate that the ability to develop sustainable competitive advantage depends on a firm's ability to convert knowledge into capabilities to meet environmental demands. Fiol (1996) refers to organisations as sponges that have different absorbing capacities. The ability of a firm to recognise the value of new, external information, assimilate it and apply it to commercial ends is named by Cohen and Levinthal as the "Absorptive Capacity". Absorptive capacity is described as the dynamic learning process of acquiring, assimilating, transforming and exploiting knowledge (Cohen and Levinthal 1990; Zahra and George 2002). Cohen and Levinthal (1990) view absorptive capacity as a firm-level construct: the ability the firm develops over time by accumulating a relevant base of knowledge.

Drawing from an extensive literature review (Table 2), three major components have been identified which cumulatively contribute to absorptive capability:

1. Ability to gain and release resources.

This is the ability of firms to capture and use the new knowledge. Researchers assume that this ability differs between firms and that each organisation has a certain ability to learn. Cohen and Levinthal (1990) argue that the ability to evaluate and utilise new knowledge is largely a function of the level of prior related knowledge. In particular, much of the research on individual levels has shown a positive relationship between prior knowledge and skills and the ability to acquire new knowledge and learn new skills. Ellis (1965) and Anderson *et al.* (1984) found that individuals' prior basic skills in a specific subject (algebra, computer programmes) facilitate knowledge assimilation and the ability to learn new, advanced skills related to that subject. Studies on the learning process of international joint ventures have also confirmed the importance of a prior knowledge base to the recipient firm's relative absorptive capability (Shenkar and Li, 1999; Lane, Salk and Lyles, 2001). However the individual skills and knowledge need to be transferred and shared among organisation members in order to come up with new ideas and products. The shift from individual learning to organisational learning is a key dimension of the absorptive capacity of firms.

Table 2. Absorptive capacity literature.

Variables	Definition and items	Literature
Ability to gain and release resources	This is the ability of firms to understand, capture, use and assimilate the new knowledge. It is a function of prior knowledge base: employee education; technical skills and learning capability of firms (learning from suppliers, partners, customers, best practices etc).	Zahra and George, 2000; Cohen and Levinthal, 1990; Lane <i>et al.</i> , 2001; Lane and Lubatkin, 1998.
Communication culture and structure	The atmosphere within the organisation that defines accepted communication behaviour that may facilitate or hinder the communication process.	Adler, 1965; Cohen and Levinthal, 1990; Levinson and Asahi, 1995; Tsai, 2001; Kholi and Jaworski 1990.
Scanning the environment	The ability of firms to detect and trace external changes, relevant information and knowledge and use this for internal decision making process and adaptability to environment dynamics.	Cohen and Levinthal, 1990; Levinson and Asahi, 1995; Roth <i>et al.</i> , 1994; Zahra and George, 2002.

As Nonaka and Takeuchi (1995) argue, organisational knowledge creation should be understood as a process that organisationally amplifies the knowledge created by individuals and crystallises it at the group level through dialogue, discussion, experience sharing or observation. So far it can be said that gain and release capability of organisations is a function of *prior knowledge base* and *knowledge sharing* among a firm's members.

2. Communication culture and structure

This is the atmosphere within the organisation that defines accepted communication behaviour which may facilitate or hinder the communication process (Adler, 1965). Cohen and Levinthal (1990) argue that the structures of communication and integration of knowledge are essential for enhancing absorptive capacity (AC). Various authors regard the communication climate as an important factor impacting the communication process (Tsai and Ghoshal, 1998; Levinson and Asahi, 1995; Adler, 1965). Levinson and Asahi (1995) argue that an open culture that views change as positive can facilitate communication and thus the learning process. Zahra and George (2000) argue that new knowledge creation requires routines that simplify and facilitate communication and allow members of the firms to explore ways in which they can use existing knowledge or develop new knowledge. They argue that structural, cognitive, behavioural and political barriers may stifle the effective sharing and integration of knowledge. Other studies focus on organisational structures (the degree of formalisation and centralisation) as factors that highly influence the communication process. Structures are important as they define how firms process knowledge because organisation members interact not only as individuals, but also as actors

performing organisational roles (Lane and Lubatkin, 1998). For example, Galbraith and Merrill (1991) found that the centralisation of R&D decisions was negatively related to the level and quality of innovation. Clark and Fujimoto's (1991) study on project development in the automobile industry showed that coordination methods greatly impact the performance of firms in realising new products in such dimensions as lead time, costs and quality.

Many studies of international joint ventures support the fact that *learning structures* and *openness to new knowledge* are important for creating new skills and knowledge building (e.g. Lyles and Salk, 1996; Nonaka, 1994).

3. Scanning the environment

In rapidly changing environments, the ability to sense the need to reconfigure the firm's asset structure and to accomplish the necessary internal and external transformation is very important (Amit and Schoemaker, 1993; Langlois, 1994). Until recently, the focus has been on the absorptive capacity of firms to capture, use and share their internal knowledge. However, as Cohen and Levinthal (1990) argue, firms need to have a scanning ability to monitor the external environment and identify new, appropriate knowledge. By scanning the environment (sense making), organisations receive and interpret messages about new markets, new technologies and competitive threats; this enables the organisation to connect with its environment and invest wisely, thereby generating superior returns (Teece, 2000). The ability to calibrate the requirements for change and make the necessary adjustments appears to depend on the ability to scan the environment, to evaluate markets and competitors and to quickly accomplish reconfiguration and transformation ahead of competition (Teece, *et al*, 1997).

Environment scanning can be realised in different ways by *training employees, sending them for advanced training, encouraging them to monitor and read literature and publications, benchmarking and technology assessment* (Cohen and Levinthal, 1994). Levinson and Asahi (1995) also claim that *monitoring and surveying customers and suppliers and learning from partners, strategic alliances and best practices* may also impact the capability of organisations to scan the environment and capture new external knowledge. Investing in basic research and development and providing training programmes for employees could improve a firm's ability to understand and exploit external knowledge and resources (Cohen and Levinthal, 1990). Accordingly, firms can not take advantage of networks if they do not possess some types of absorptive capacities which allow the firm to alter, integrate and recombine its resource base to generate new value-creating strategies (Grant, 1996, Pisano, 1994).

The above discussion leads to the formulation of the following hypothesis:

Hypothesis 2: The greater the absorptive capacity of participating firms in the network, the larger is the value creation and appropriation potential.

Social capital

Social capital also affects a firm's ability to create value (Tsai and Ghoshal, 1998). Empirical studies have provided strong support for the idea that social capital facilitates value creation. Social capital encompasses many aspects of a social context, such as social ties, trusting relations and value systems, which facilitate the actions of individuals located within that context (Tsai and Ghoshal, 1998). Social capital is broadly defined as an asset that exists in relationships and networks (Leana and Van Buren, 1999). The relational view suggests that value creation derives not only from firm level resources, but also from difficult-to-imitate capacities embedded in dyadic and network relationships (Dyer and Singh, 1998). By building relationship-specific assets, knowledge-sharing routines and effective relational governance mechanisms into relationships, firms can leverage their relational resources for knowledge acquisition and exploitation. Because the acquisition and exploitation of knowledge are predominantly social processes (Kogut and Zander, 1992), social capital may be a critical element for the value creation.

Many studies have pointed out that social capital is a productive resource, facilitating actions that range from an individual's occupational attainment (Lin and Dumin, 1986; Marsden and Hubert, 1988) to a firm's business operations (Burt, 1992, Coleman, 1990). Nahapiet and Ghoshal (1997) presented a theoretical model where they analysed how social capital contributes to value created.

Tsai and Ghoshal (1998) tested their model empirically in a multinational electronics company and found that social capital dimensions such as social interaction, trustworthiness and shared vision had significant effects on resource exchange and combinations, and thus on the value creation potential of firms.

Social capital encompasses many aspects of a social context, such as social ties, trusting relations and value systems, which facilitate the actions of individuals located within that context (Tsai and Ghoshal, 1998). Nahapiet and Ghoshal (1998) distinguish three main dimensions of social capital: the structural, relational and cognitive dimensions.

The structural dimension of social capital refers to the overall pattern of connections between actors: who you reach and how you reach them? It includes social interactions and network ties between actors that constitute channels for information and resource flows (Tsai and Ghoshal, 1998). Through social interaction, an actor may gain access to other actors' resources (Tsai and Ghoshal, 1998).

The relational dimension describes the assets created and leveraged through relationships, such as trust and trustworthiness, norms, obligations and expectations. In particular, trust is a central governance mechanism in the social relationships between organisations (Uzzi, 1997); it concerns the fact that an individual expects a community to be based on honesty, cooperation and joint norms (Onyx and Bullen, 2000).

The cognitive dimension refers to those resources providing shared representations, interpretations and systems of meaning among parties. It includes shared language and codes that facilitate a common understanding of collective goals and proper ways of acting in a social system (Nahapiet and Ghoshal, 1998).

In this study we were especially interested in assessing the social interaction and level of trust among participating firms as primary basis for knowledge creation and sharing in the network. These two components were assessed using a five-point Likert scale response format (Table 3).

The above discussion leads to the formulation of the following hypothesis:

Hypothesis 3: Social capital impacts the value creation potential of networks; therefore, the greater the relational capital held by network firms (mutual trust, reciprocity and proximity of interaction), the greater is the value potential of the network.

3. Research methodology

Given the objectives and purpose of the present study, an e-mail survey was used to collect empirical, quantitative data. The sample of the study consisted of small and medium-sized tourism firms which participate in and/or use the

Table 3. Social capital literature and items operationalisation.

Variables	Definition and items	Literature
Social interaction	The extent of communication and linkage with other participating firms to facilitate knowledge/information sharing and development of common goals, norms and reciprocal expectations.	Dyer and Singh, 1998; Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Renko, Autio and Sapienza, 2001; Kogut and Zander, 1992.
Trust	The extent to which a firm believes that its exchange partner is benevolent and honest. Trust is closely related to the norm of reciprocity.	Geyskens and Steenkamp, 1995; Barney and Hansen, 1994; Renko <i>et al.</i> , 2001;

functionalities of network tourism systems (obtained from databases of well-established tourism destination systems organised in a logic of virtual networks) and which make use of some basic ICT tools (firms with an e-mail or internet address were chosen from databases). Specifically, the target population included small hotels, residences, tourist villages, guest houses, museums, historic buildings and restaurants.

Using these criteria, a total of 600 firms were selected from three main European destination systems databases and were contacted during a period of two months. Of the 600 firms surveyed, 134 completed questionnaires were returned, producing an initial response rate of 22.3%. Five of these responses had missing data. Missing data refers to "information not available for a subject (or case), even if other information is available for that subject," (Hair *et al.*, 1998, p. 38). In accordance with this definition, cases with missing data were dropped from subsequent analyses.

In designing the questionnaires, the Tailored Design Method (TDM) was used as a guide (Dillman, 2000). The final questionnaire submitted to the sample included a four-page structured questionnaire. In total, 50 items were designed to address the variables under study. The items were primarily derived from previously tested survey instruments to take advantage of well-tested psychometric measures (Straub 1989). A five-point Likert scale was used as the response

format, with two value ranges: strongly agree – strongly disagree and great extent – little extent.

The data provided were analysed by using a series of descriptive and multivariate statistics processed into the Statistical Package for Social Sciences (SPSS) version 12.0 for Windows.

Validity and reliability

Before testing the hypotheses, the reliability and validity of the data obtained were checked. To test the reliability of the measures, Cronbach's alpha was used, as suggested by Nunnally (1978). For reliability, a commonly used threshold value is for the alpha to be greater than 0.70 (Nunnally, 1978). A satisfactory level of alpha for all measures in the study was found. All alpha coefficients ranged from 0.71 to 0.95 (Table 4).

In addition to Cronbach's alpha, another measure of reliability is average variance extracted (AVE). This is particularly useful for latent construct measurement. According to Fornell and Larcker (1981), as a commonly used threshold value, AVE should be higher than 0.5. The second test confirmed the first test of reliability, since all AVE values were greater than 0.50, ranging from 0.67 to 0.80 (Table 4). The items therefore measured what they were supposed to measure and were therefore acceptable for further analysis.

Table 4. Reliability results.

Variables	Efficiency	Complemen- tarities	Lock in	Novelty	Social interaction	Trust	Scanning the environment	Gain and release	Communication culture
Reliability α (should be >0,70)	0.95	0.87	0.83	0.92	0.91	0.71	0.91	0.89	0.93
AVE (should be >0,50)	0.71	0.67	0.67	0.69	0.75	0.78	0.71	0.69	0.80

The discriminant and convergent validity of measurements were tested by using the factor analysis method. Factor analysis is a multivariate statistical technique that helps the researcher to determine whether a certain set of items does or does not constitute a construct (Straub 1989). The factor loading of items is the principal measure for convergent and discriminant validity. For the data to have convergent validity, a high load of items on their associated factors is required (loading $>.50$), and each of the factors must load more strongly on their associated factors than on any other factor (Chau and Tam, 1997) (Appendix 2.a). The convergent validity test was supported by performing principal component factor analysis. Varimax with the Kaiser normalisation rotation technique was used to determine the factor expressed by items. All items loaded on the appropriate factor, with loadings typically ranging from 0.70 to 0.93. The discriminant validity was assessed by comparing the average variance extracted (AVE) values associated with each construct with the correlations between constructs (Staples, Hulland, Higgins, 1999). For discriminant validity, the square root of the AVE values should be larger than any other corresponding value of rows and columns (Staples *et al.*, 1999). Appendix 2.b presents the correlation matrix. All square roots of the AVE result had to be larger than any other corresponding correlation coefficient of rows and columns. This criterion was met by all but two constructs (Appendix 2.b). The Lock-in (LI) and Communication Culture (CC) constructs had correlations with their indicator variables (diagonals in Appendix 2b) that were less than the correctors with indicator variables of other constructs (off-diagonals in Appendix 2.b). This means that LI and CC constructs correlated more highly with other constructs in the model than their indicator variables.

4. Research findings

In this section the statistical tests performed in this study are presented. First of all, some preliminary tests were conducted to ensure that the data were suitable for further statistical testing. These preliminary tests included the response bias test, multicollinearity test and Bartlett's test of sphericity. Descriptive analysis statistics were applied to see if the respondents claimed to have benefited from participating in the network systems. To test the relationship and the strength of influence of other variables in value creation, we used multiple regression analysis. The results of these last two statistical analyses are reported in subsequent sections.

Preliminary data analysis

To determine the non-response bias of the data, the t-test was performed. We compared the descriptive data between the two groups: the early respondents and late respondents. To classify early and late respondents we used the midpoint of the data collection period. Of 129 questionnaires returned, 55 (42.6%) were from late respondents (those who responded in the second time period), while 74 (57.4%) were from early respondents. For all variables the significance level of the t-test was greater than 0.05 and as such it can be concluded that no significant differences exist between the two groups. Based on these findings, response bias could be confidently ruled out in this study (Appendix 1).

For testing the normality of data, the skewness and kurtosis tests were applied. The violation of normality could invalidate statistical hypothesis testing (Hair *et al.*, 1998). Skewness is a statistic that provides information about the symmetry of data distribution (Pindyck and Daniel, 1998). Kurtosis refers to the proportions of scores in the middle of a distribution or in its tails relative to those in a normal curve, and it usually explains the relative peakedness or flatness of a distribution compared to the normal distribution. As a rule of thumb, a skew value should be within a $[-2; +2]$ range when the data are normally distributed and kurtosis also should be within a $[-2; +2]$ range when the data are normally distributed (Garson, 2001). The results of skewness and kurtosis demonstrate that the data were normally distributed and as such no further treatment, such as log-transformation, was required. Kaiser-Meyer Olkin's measure of sampling adequacy (MSA) test and Bartlett's test of sphericity were used to assess the suitability of the survey data for factor analysis (Appendix 2). The value of the MSA test is high (0.95), which indicates that the proportion of variance in the variables is common variance. The significance level of this test gives the result. In order for data to be suitable for factor analysis, the significance level had to be less than 0.05. In this study the significance level for the Bartlett's test of sphericity is 0.00, which means that the data were appropriate for factor analysis.

Before conducting regression analysis of data, it is necessary to check if the variables have any collinearity problem; if little variation is unique to each variable, regression coefficients can not be interpreted reliably and the conclusions will not be correct. As a first step, the Pearson correlations of different independent variables were checked. As rule of thumb, correlation coefficients greater than or equal to 0.80 indicate that there might be a multicollinearity problem in the variables (Kennedy, 1998). Appendix 2 lists the correlations of independent variables. The highest value in the table is 0.70. This means that in this step no multicollinearity problems were signalled. Other

tests used to detect multicollinearity are the condition index and eigenvalues. The rule of thumb for this test is that if the values of condition indexes are greater than 20, there may be collinearity problems in the data (Greene, 2000). Eigenvalues provide an indication of how many distinct dimensions there are in the independent variables. When several eigenvalues are close to zero, the variables are highly intercorrelated and small changes in the data values may lead to large changes in the estimates of the coefficients. The eigenvalues and condition indexes values are presented in Appendix 3. The condition indexes are all smaller than 20, but looking at the eigenvalues, dimension 5 seems to have a collinearity problem as its eigenvalue is close to zero, meaning that there are four main distinct dimensions in the model. However in this step it is difficult to determine which of the variables is causing the problem. Therefore, according to these multicollinearity tests, we can state that no serious collinearity problems in the independent variables were

detected. The only thing to take into consideration, when we later performed the regression analysis, was the fact that there might be four dimensions instead of five that influence the variance of the model.

Value creation results

The value creation potential of firms was measured by asking the respondents to indicate their level of agreement on a five-point scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) with specific statements addressing various value sources that could derive from networks. In accordance with the Amit and Zott (2001) framework, the value creation variable was split into four principal factors: efficiency, innovation, lock-in and complementarities. A descriptive analysis of the survey responses was conducted to see if the respondents claimed to have benefited from participating in the network systems (Table 5).

Table 5. Value creation statistical results.

Items	Mean	Standard deviation	Items	Mean	Standard deviation
Efficiency (EFF)	$\alpha = 0.96$		Complementarities (CO)	$\alpha = 0.87$	
Reduce costs for marketing, sale, promotion and distribution	3.9	0.9	Integration of different services and information;	2.9	1.2
Reduce time of transaction processing	3.9	0.9	Use and application of common technology	3.2	1.2
Reduce operational costs	3.1	1.2	Easier accessibility to the complementary product	3.3	0.9
Access to more products, services and information	3.7	0.9	Use of relationships to offer non-proprietary information	2.9	1.2
Aggregate the supply	3.8	0.9	Selling other non-tourism products	2.9	1.2
Reduce time required for development and delivery of product	3.9	0.9	Novelty (NO)	$\alpha = 0.92$	
More informed decision making process	3.5	1.1	Entering new market segments	4.0	1.2
Reduce asymmetry of information about goods and products	3.6	0.9	Creating new services and products	3.4	0.9
Improve inventory management	3.2	0.9	Quality improvement	3.0	1.2
Improve yields	3.1	1.0	New collaborating participants	3.3	0.9
Lock In (LI)	$\alpha = 0.83$		New ways of doing business	3.1	0.9
Benefit from the use of customer relationship programmes of the system	3.5	1.3	New distribution, advertisement and delivery channels	3.9	0.9
Direct interaction with our customers	3.6	1.0	New content base	3.9	0.9
Use personalised profiles to offer customised products	2.9	1.4			
More alternatives at our disposition to interrelate with the customers	3.9	1.0			

Efficiency

The measurement scale for efficiency consisted of 10 items that reflect the perceived benefits participating firms have in terms of cost reduction, transaction time and information. The statistical analysis shows that respondents generally tend to have positive effects by participating in the network. In particular they agree with the fact that being part of a virtual network reduced the time of transaction (Mean - $M=3.9$, Standard Deviation $SD = 0.9$), reduced marketing and distribution costs ($M=3.9$, $SD= 0.9$), gave them the possibility to aggregate the supply ($M=3.8$, $SD= 0.9$) and to access other products and services ($M=3.7$, $SD=0.9$). More than half of the surveyed firms assigned higher values to these issues (approximately 50-60% of respondents), while some 25-30% tended to give an average agreement to these issues. Respondents tended to provide a lower ranking for the items concerning operational costs ($M=3.1$, $SD=1.2$), inventory management ($M=3.2$, $SD=0.9$) and yields ($M=3.1$, $SD=0.9$). Only one-third of the surveyed firms assigned higher agreement to these items.

Lock-in

The measurement scale for the lock-in consisted of four items. Statistical analysis showed that in general respondents tended to strongly agree that they can benefit from customer relationship management CRM activities ($M=3.5$, $SD=1.3$) and that they have more alternatives to interrelate with customers ($M=3.9$, $SD=1.0$) and to directly interact with their customers ($M=3.6$, $SD=1.0$). On the other hand, respondents were less likely to agree with the possibility to provide more customised products and services ($M=2.9$, $SD=1.4$). The percentage of respondents who strongly agreed with the possibility of customisation was relatively low, approximately 34%, while 28% were somewhat disinterested in the consequences related to this item, and about 36% didn't agree with the fact that the network can help them to customise products and services. Thus, the tourism firms in this study generally indicated that they have benefited from the new alternatives offered to them in terms of interaction and collaboration with customers, but that they did not agree with the customisation possibilities.

Novelty

The novelty construct was measured using seven items that explain different types of novelties that can be realised by tourism firms. Respondents were asked to indicate their agreement level regarding the facilitations that were achieved by using the system. The survey demonstrated that in general firms were likely to agree with almost all items (means ranged from 3 to 4 for included items). Specifically, they strongly agreed with the items concerning the facilities created by the system for entering new markets

($M=4.0$, $SD=1.2$), for using new distribution channels ($M=3.9$, $SD=0.9$) and for the possibility to add new content to their offers ($M=3.9$, $SD=0.9$). They also agreed that the network system could offer opportunities regarding the creation of new products and services ($M=3.4$; $SD=0.9$), for quality improvement ($M=3.0$; $SD=1.2$), for possibilities to collaborate and cooperate with other participants ($M=3.3$; $SD=0.9$) and to create new ways of doing business ($M=3.1$; $SD=0.9$).

Complementarities

The complementarity construct consisted of five items that reflect the facilities created by tourism system to sell and to access other products. Based on the mean values for each item, the respondents tended to agree that participating in a virtual network allows them to access, use and integrate others' products and services. More specifically, they tended to agree that they can use a shared technology for putting their offers online ($M=3.2$, $SD=1.2$), and also that they can more easily access other products ($M=3.3$; $SD=0.9$). Additionally, they also agreed that participating in a network facilitates the possibilities to relate with others and offer more in-depth information ($M=2.9$, $SD=1.1$), to sell other products (tourism or non-tourism ones) ($M=2.8$, $SD=1.2$) and to integrate services and information ($M=2.9$, $SD=1.2$).

Absorptive capacity and social capital results

The descriptive statistics for the absorptive capacity and social capital constructs were also determined. Table 6 contains the mean values for each item of absorptive capacity used in the study. As can be seen from the table, the respondents generally tended to develop their capabilities for scanning the environment and gaining more capability to evolve and to sustain their development mainly by trying to learn from their customers, partners and best practices. Learning from customers seemed to be the most important issue for the firms' prosperity and for value creation, confirming the importance of customers for the sector. The results seem to indicate that firms do not tend to be highly involved in activities aimed at identifying new opportunities and adapting to new, complex changes. The respondents gave lower values to such issues as: the involvement of firms on scanning the environment, reading sector publications and participating in training courses.

The values on items related to the internal dissemination of new information and knowledge among staff members and the tendency to respond to new challenges were ranked at a middle level (on 1 to 5 scale). Firms tended to share the new information about markets (when available) throughout the organisation, to encourage the exchange

of information between different levels of employees as well as to organise various inter-level meetings for knowledge sharing, learning and better decision making. Despite these satisfactory results on the internal sharing process, the scan of the external environment was ranked lower, meaning that small tourism firms were not capable of being very innovative in capturing market changes. They were unable to realise major changes and to create sustainable value without capturing, configuring and sensing what is happening externally in the global environment.

A possible solution for raising the level of environmental scanning in individual tourism firms could be the engagement of a central broker in the monitoring, and then distributing the new knowledge captured to others in the network. Because the transferability and the internal communication culture seem to favour knowledge sharing, this solution could be very important for the sustainability of firms, for the innovativeness of the sector and for the value creation process.

Firms in the study tended to show a growing interest to interact and share knowledge and information, but they were still reluctant to consider the information provided by others as truthful and reliable. Table 7 presents the mean values for each item of social capital used in the study.

The statistical analysis showed that, on average, respondents tend to avoid taking actions that damage others (M=3.3) and are predisposed to share the information with others (M=3.0). Looking carefully at the social interaction items, it could be seen that firms tend to interact frequently and

to cooperate by sharing customer information (M=3.0) and acquiring new customer contacts (M=3.0). They also agree with the fact that the community feeling is important for the social interaction among various actors (M =3.1). However, the trust level between participants in the systems is relatively low. Specifically, respondents say that they do not usually consider others' information to be reliable (M=2.2), while the trusting relationships between participants were evaluated at a medium level.

Regression analysis results

In order to assess the relationship and the direction of relations between the constructs of the hypothetical model,

Table 7. Mean values of social capital items.

Social Capital Items	Mean
Social Interaction	
We feel part of the local community	3.1
We avoid taking actions that damage others	3.3
We share information with other destinations	3.0
We share customers' information with others	3.0
We have acquired new customer contact from others	3.0
Trust	
Others' information is reliable	2.2
Open, trusting relationship	3.1

Table 6. Mean values of absorptive capacity items.

Absorptive capacity results					
Scan the environment	Mean	Communication	Mean	Gain and Release Resources	Mean
Scan the environment to identify new opportunities	2.4	Important market information is disseminated throughout	3.0	Employee education	3.3
Spend time reading sector publications	2.3	Marketing strategies are made in accordance with other business levels	2.7	We encourage informal information exchange between levels	2.9
Participate in workshops, meetings and conferences	2.6	Employees share the ideas freely	2.7	We organise inter-level meetings	2.8
Learn from customers;	3.2	Employees share a very open communication environment	3.0	Employee technical skills	2.7
Learn from suppliers	2.8	Employees support new ideas	2.8	Reconfigure internal resources to come up with new solutions	2.6
Learn from partners	3.0				
Learn from best practices	3.2				

a stepwise multiple regression analysis was performed. Before conducting the regression analysis for hypothesis testing, there is a need to determine if the data satisfy the main assumptions for regression analysis. These main assumptions include data normality and multicollinearity of independent variables (Appendix 3).

The stepwise regression method is an automatic procedure that develops a series of regression analyses by adding or deleting a variable at each step. The criterion for adding or deleting an independent variable can be stated equivalently in terms of error sum of squares reduction, coefficient of partial correlation, t statistic or F statistic (Neter, Kutner, Nachtsheim and Wasserman, 1996). When completed, it develops the best set of independent variables that influence the dependent variable.

The dependent construct for this test was the value creation in the virtual network. The independent constructs were social capital and absorptive capacity. These two constructs are expressed with other measurable variables. The absorptive capacity is expressed by three other factors: gain and release capability (GR), communication and coordination (CC) and the ability of firms to scan and sense the environment (SE). The social capital construct is expressed by two factors, social interaction (SI) and trust (TR). In Table 8, the results of stepwise regression analysis are presented.

According to Maddala (1997), to determine the best model, the goodness-of-fit test of each model is analysed. That indicates the accuracy with which a model approximates the observed data. In regression models, one of the most frequently used methods is the R².

Model 1 evaluates the regression statistics for the communication culture independent variables. The relationship coefficient R, the R² and the adjusted R² revealed that communication culture is highly correlated with value creation, and specifically that 77% of variation in value creation can be explained by communication culture. The second model evaluates the influence of an additional independent variable, the SE variable. The results show that these two variables together explain about 80% of the variation in value creation. The third model gives the total influence of all three variables that explain the absorptive capacity construct. As it can be seen in Table 8, the total influence of these three variables accounts for 81% of VC variation.

The final model explains that another variable from the study could better explain the variation on value creation. This is social interaction, which together with the three previous variables of absorptive capacity, gives the best subset of independent variables that relate to and influence the value creation capacity of firms. In particular they contribute about 83% of the variance on value creation. The only variable that was rejected by the stepwise regression analysis was the trust variable. This is in accordance with the multicollinearity result, which showed that in principal there are four main dimensions that could better explain the model. These results show that the trust variable does not have a great affect on value creation potential of firms. Because the tourism market is highly volatile with high turnover rate of SMTEs and entrepreneurs, trust is more difficult to establish. It can therefore be concluded that

Table 8. Stepwise regression analysis.

Model	R	R ²	Adjusted R ²	St. Error	F Change	Sig. F change
Model 1	0.879	0.772	0.770	0.48	430.682	0.000
Model 2	0.898	0.806	0.803	0.44	21.986	0.000
Model 3	0.905	0.819	0.814	0.43	8.644	0.004
Model 4	0.91	0.82	0.82	0.42	4.76	0.031

Note: Model 1: Predictor Communication Culture variable
 Model 2: Predictor Communication Culture variable;
 Scan and Sense the environment Variable.
 Model 3: Predictor Communication Culture variable;
 Scan and Sense the environment Variable
 Gain and release variable
 Model 4: Predictor Communication Culture variable;
 Scan and Sense the environment Variable
 Gain and release variable
 Social Interaction variable.
 Excluded variable – Trust

model 4 represents a better way to explain the relationships between factors. Table 9 below shows the regression results for model 4.

The multiple regression analysis showed that there is a regression relationship between the dependent factor value creation and the set of four independent factors (environment scanning (SE), communication and coordination (CC), gain and release capability (CR) and social interaction (SI)). In particular, the four retained factors in the model explain up to 83% of the variance in the value creation potential of firms. Figure 1 contains the betas and p-values of each independent factor. Specifically, the communication culture (Beta 0.37) and the gain and release factors (Beta 0.27) greatly impact the value creation construct. This means that in order for organisations to appropriate and create value, they need to have a suitable

communication culture that allows knowledge transfer and sharing. Regarding the gain and release factor, the study shows that the access to new knowledge and the capacity of firms to elaborate, integrate and use that knowledge for realising their objectives is an essential component for value creation.

5. Discussion of findings

Value creation discussion

Generally speaking, the hypotheses proposed in this study were supported with significant values. In particular, statistical results suggest that small and medium tourism enterprises (SMTEs) participating in a specific network had more possibilities to create value both internally and

Table 9. Regression results of final model.

Independent factors	Standardised Beta	t-value	Significance level
CC	0.372	3.988	0.000***
SE	0.178	2.265	0.025*
GR	0.266	3.039	0.003**
SI	0.153	2.183	0.031*
Model Summary	R = 0.908	R ² = 0.825	Adjusted R ² = 0.820
F = 4.764			
P = 0.003			
α = 0.05			

*- Significance at $p < .05$; **- Significance at $p < .01$; *** - Significance at $p < .001$

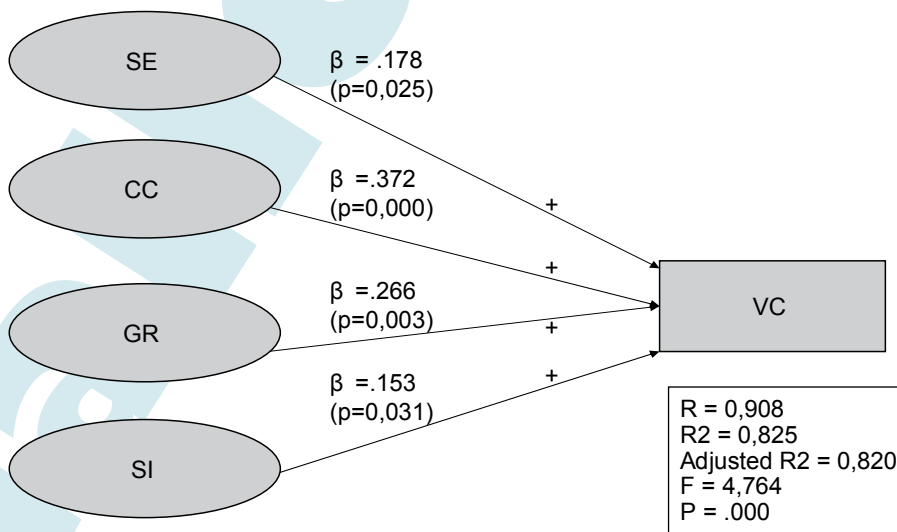


Figure 1. The final model with directions and B-values.

externally in relationships with suppliers, customers and partners. All mean values ranged from a minimum of 2.9 to a maximum value 4.1 (out of 5).

The respondents were especially satisfied with the possibilities they could exploit in terms of customer relationship and innovation. By participating in network systems, firms reported having more possibilities to relate with their customers and to sell their products worldwide. Even if small firms do not have websites, call centres or technological applications for relating with customers, they could benefit from the central CRM system of the network. These findings appear to be very relevant for tourism products, which are considered to be very information intensive. Furthermore, the great majority of firms indicated that they have been able to use the system opportunities for entering new markets, realising new products/services, creating new contents and new solutions and using new distribution channels. The very nature of tourism products facilitates their entrance in new markets without substantial investment costs. Also, the exploitation of new digital methods for delivering and distributing products is much more feasible than for other products. The participation of SMTEs in networks helps them to enhance their ability to market their structures to individual travellers worldwide, to persuade potential customers and to provide them with unmatched online services. All these can be provided without requiring firms to make high technological investments. Representation using a unique and recognised brand name especially helps firms to expand their business worldwide. Accordingly, the great majority indicated that they had been able to use the network system opportunities to enter new markets, realise new products/services, create new content and new solutions and to use new distribution channels. Thus, the data showed a clear trend toward innovation amongst participating firms.

Another widespread benefit was related to Efficiency Gains in terms of time and distribution costs. Respondents attributed high value to the items related with these issues. These results obviously were related to the sample characteristics. Most of the respondents in the sample make some basic use of information technologies, in particular e-mail and internet (respectively 100% and 93%), to communicate and interact with different groups. As such, ICT may possibly reduce the number of inefficiencies in processes by allowing file and data sharing, thereby contributing to the elimination of mistakes from manual procedures and reducing the required time for transactions. Efficiency is also attained by streamlining internal processes, by enabling faster and more informed decision making and by speeding up transaction processing.

Regarding distribution costs, the sample firms reported major benefits. This is related to the fact that one of the

most common uses of internet and ICT in travel sectors is for distribution. Customers also search for most travel services on the internet, making travel services one of the top selling products on the internet. As result of direct distribution and elimination of intermediaries, significant cost savings could be attained. ICT was also found to support the value firms could create by being able to access diversified types of information in a symmetric fashion. All firms can aggregate different types of information and services by networking with other firms and diversifying their products by designing distinctive integrated packages to satisfy special tourist demands. For example, if a customer residing in a hotel asks for information about and a reservation at a good restaurant in a specific area, or a list of events during the period he/she is residing in the area, the hotel's staff is able to provide this information with a click of mouse simply by relating with the central network and interrelating with others in the area. This makes it easier to access others' services; various types of information and services could thus be grouped together according to customer needs.

Most firms engage in collaboration in order to have access to resources, skills and knowledge that they lack. It was found that firms tend to use network links to build integrated products and services from a complementary perspective and to have access to specialised knowledge they lack. They also use the networks to sell other products, mainly those that complement theirs through up-selling or cross-selling. Even more important for SMEs is that they can use common technology tools without having to make substantial investments. In this way network links serve the need of participating firms to access complementarities to fill gaps in resources and capabilities.

Regarding internal activities such as operational costs, yields and inventory management, firms did not report many benefits. This could be explained in part by the limited use of advanced ICT applications by firms, which can be very powerful in lowering costs and facilitating internal activities. Being part of the network could not bring significant improvements in these areas, since these types of networks offer a technological platform that could be used primarily for external activities, relations and internetworking. The improved efficiency in operational costs and yields is related more to the internal use of ICT applications that interrelate and integrate various departments and units within organisations.

In accordance with previous research results, the respondents did not report many benefits regarding product and service customisations. Although customisation was one of the priorities for firms, they did not obtain important benefits in this regard from being part of the network system. The explanation for this could be the tendency of managers to not perceive customisation with particular interest. And this

lack of interested could be explained in part by cost and technological issues and in part by the dominant perception that tourists are experiential and by definition not loyal; as such, it would be a waste of money and time trying to retain tourists. As a result, priority is given to attracting new customers.

These results highlight the importance of virtual networks for SMEs and suggest that effective networks could increase innovation and improve firm efficiency. A firm participating in a network can create greater value by being able to improve the quality of products, by producing products and services more rapidly and at lower costs, by being more efficient in terms of time and costs and by being more customer-centric. Since networks are composed of different firms, a frequent result of their interaction is the creation of new knowledge, which in turn could result in a new solution or a new combination of resources to realise innovation.

Discussion of absorptive capacity and social capital influence

The second test in this study consisted of evaluating the influence and the dependence of value creation on such factors as absorptive capability and social capital. The literature review suggested that these two factors are very relevant to understanding value creation and for developing sustainable competitive advantage.

The regression analysis concluded that the value creation of participating firms was influenced by and was a function of the development of the social and absorptive capabilities of firms. Specifically, this analysis demonstrated that the components of social capital and absorptive capacity together explain up to 83% of variation in the value creation capacity of firms (Table 6). The more firms have developed their abilities to look at and capture the external environment, to identify and incorporate new information and knowledge and to use appropriate communication channels and open their culture to facilitate knowledge sharing and change, the more likely they are to create value by exploring different and distinctive knowledge bases and by relying on learning process, which in turn leads to innovation.

Regarding the social capital construct, the analysis showed that social interaction was very relevant for combination and exchange among firms. The beta value for this item was 0.15 with p value significantly different than 0 ($p = 0.003 < 0.001$). Unexpectedly, it was found that the trust variable did not greatly influence the value creation of firms in the sample. In a further analysis it was also found that the trust variable presents some multicollinearity problems and it was therefore dropped from the regression analysis. As suggested by the literature (Tsai and Ghoshal, 1998; Uzzi,

1997), trust is among the most important factors to be taken in consideration for the firms in order to maximise and appropriate value. The explanation for this unexpected result could be the very characteristics of the tourism firms themselves, such as seasonality, high turnover rate, free-riding and individualistic culture. Because firms in the network systems are competitors and collaborators at the same time, they tend not to trust each other very much. As suggested in the literature, trust could emerge from establishing and nurturing common beliefs and values (Pyke *et al*, 1990) and from frequent contacts and face-to-face meetings among firms. Because the tourism market is highly volatile with a high turnover rate of SMTEs and entrepreneurs, trust is more difficult to establish. In general, the kind of trust that could be established between tourism firms in a network could be based on the moral imperative and the social fabric they are part of. Furthermore, the fact that these network systems have been realised recently and have a short lifespan undermines trust and the reliability to others.

In general, the type of trust that prevails in the initial phases of network systems (especially in tourism) is an embedded one, created between the central actor and other firms. Firms interact mostly with the broker actor, and they trust the information they can retrieve through this actor. The central actor has some kind of social capital in its relations with local tourism firms and stakeholders, based on a long-term relationship between them. Therefore, these actors are indispensable to ensure that the network creation is based in this embedded historical social capital.

Still, the central element for the efficiency and long-term sustainability of a network is the creation of sufficient trust through a process of mutual learning. As in other cases where networks are created with a top-down approach that is initiated and stimulated by a central actor, the trust has to be suitably stimulated and guided by the network broker. Through frequent interactions, firms can have access to a wide range of complex assets and competencies to expand their access to technology, markets and partnerships and to access others' externalities and complementarities. However, the pursuit of value creation depends on the firm's ability to recognise sense and seize external knowledge. In order for firms to create and appropriate value through networks, they need to emphasise knowledge assimilation and sharing and create continuous learning capability.

6. Implications of the research findings

In an increasingly flexible and uncertain market, an understanding of how firms' competitiveness can be enhanced and sustained is a fundamental issue. This study has provided empirical data to support the virtual network

model as a viable model for the competitiveness of small and medium-sized tourism entities. The research findings have several important implications for practitioners.

First of all, the results support the idea that tourism systems organised in the logic of virtual networks could more effectively assist small and medium-sized tourism firms to compete and to create value. This implies a need for tourism managers to better understand how these systems work and how they could be involved and benefit from participating in them. Although new internet technologies have provided new networking tools, applications and opportunities for businesses to organise and manage their activities in new and more cost-effective ways, the creation and successful implementation of new business models does not simply consist of the deployment of new technological tools and applications. The networking process between SMEs creates challenges for managing complex activities and processes inside and outside firm boundaries.

Another important finding is that value creation is not a passive process. Firms participating in a network should appropriate and create value at the same time through interactions and by developing scanning and sensing capabilities. The magnitude of absorptive capacity and social interaction among actors was a very important determinant of the level of value creation. All efforts of firms to acquire new, external knowledge, to adopt to new changes, to understand customers, to learn from customers and to provide staff training should have the objective of keeping in touch with a rapidly changing, complex environment and being able to respond in a timely and innovative way.

Further implications emerge from a closer examination of the absorptive capacity and social capital constructs presented in this study, which provide more detailed information and useful sources of managerial applications to make managers aware of the importance of these issues and to motivate them to be more proactive toward the fast-changing environment. Understanding the relationship between absorptive capacity, value creation and social interaction could help managers to adopt appropriate methods for raising their proactiveness and responsiveness level to external changes and challenges.

From a practical point of view, the study indicates that communication culture and the gain and release capacities of firms offer significant opportunities for value creation. Managers may be able to actively engage in a process that permits them to enhance these capabilities, such as organising training courses and meetings. Furthermore, the encouragement of intense knowledge sharing of market information and new ideas may eventually lead firms to even greater value-creating opportunities.

More specific implications in this study were that networking as a process may not happen without some assistance,

in terms of arranging relevant mechanisms (workshops, editing newsletters etc), energising and motivating learning and enabling effective interchange of experience. In this context it emerges that broker actors (mainly tourism destination management organisations) play an important role as facilitators and brokers for motivating, initiating and sustaining network development. In order to improve their competitiveness in the long run, the results of this study support the promotion of participation, the creation of effective linkages between different actors and the creation of an enabling and trusting environment. Consequently, as suggested in other studies, the findings of this research also support the idea that appropriate network systems may help SMEs to enter new markets, international arenas, exploit externalities and gain efficiencies in internal and external activities. These results imply a need for regional tourism managers and planners to collect information and plan appropriate networking strategies to create more competitive tourism destinations.

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Appendix 1

Non response bias T-test

Issues	Groups	N	Mean	Std. Dev	T	df	Sig.*
Type of business	Early respondents	74	1.07	0.25	0.301	127.000	0.764
	Late Respondents	55	1.05	0.23			
Yrs. in business	Early respondents	74	2.65	0.97	-1.814	127.000	0.072
	Late Respondents	55	2.96	0.98			
No. of employees	Early respondents	74	2.19	0.93	-1.242	127.000	0.216
	Late Respondents	55	2.38	0.78			
Yrs. using ICT	Early respondents	74	4.11	1.18	-2.220	127.000	0.028
	Late Respondents	55	4.53	0.88			
Type of ICT used	Early respondents	74	3.51	1.44	-0.666	127.000	0.507
	Late Respondents	55	3.69	1.57			

*p-value of 2- tail t-test

For all variables, the significance level of t-test was greater than 0.05 and as such it can be concluded that no significant differences exist between the two groups. Based on these findings, response bias could be confidently ruled out in this study.

Appendix 2: Validity statistics

Kaiser-Mayer Olkin's Measure of Sampling Adequacy (MSA) test and Bartlett's test of sphericity were conducted to assess the suitability of the survey data for factor analysis.

KMO and Bartlett's test of sphericity	Results
Kaiser-Meyer-Olkin measure of sampling adequacy	0.951
Bartlett's test of sphericity: approx. chi-square	7146.145
df	1275
sig.	0.000

As it can be seen, the Kaiser-Mayer Olkin's measure is high: 0.951. In order for data to be suitable for factor analysis, the significance (Sig.) level must be small (less than 0.05). In this study the significance level for the Bartlett's test of sphericity is 0.000, which means that the data are appropriate for factor analysis.

a. Convergent validity: factors loadings results

ITEMS	EFF	LI	NO	CO	SE	CC	GR	SI	TR
EFF 1	0.858								
EFF 2	0.864								
EFF 3	0.798								
EFF 4	0.784								
EFF 5	0.885								
EFF 6	0.902								
EFF 7	0.896								
EFF 8	0.823								
EFF 9	0.860								
EFF 10	0.849								
EFF 11	0.765								
LI 1		0.790							
LI 2		0.810							
LI 3		0.815							
LI 4		0.877							
NO 1			0.870						
NO 2			0.832						
NO 3			0.832						
NO 4			0.859						
NO 5			0.781						
NO 6			0.807						
NO 7			0.864						
CO 1				0.858					
CO 2				0.895					
CO 3				0.738					
CO 4				0.725					
CO 5				0.864					
SE 1					0.708				
SE 2					0.766				
SE 3					0.914				
SE 4					0.840				
SE 5					0.893				
SE 6					0.925				
CC 1						0.837			
CC 2						0.920			
CC 3						0.911			
CC 4						0.934			
CC 5						0.881			
GR 1							0.842		
GR 2							0.803		
GR 3							0.819		
GR 4							0.850		
GR 5							0.849		
SI 1								0.869	
SI 2								0.862	
SI 3								0.868	
SI 4								0.867	
SI 5								0.876	
TR 1									0.884
TR 2									0.884

b. Discriminate validity results: correlation matrix

		EFF	LI	NO	CO	SE	CC	GR	SI	TR
EFF	Pearson Correlation	0.845								
LI	Pearson Correlation	0.618	0.572							
NO	Pearson Correlation	0.617	0.598	0.835						
CO	Pearson Correlation	0.78	0.529	0.782	0.819					
SE	Pearson Correlation	0.622	0.757	0.664	0.611	0.845				
CC	Pearson Correlation	0.582	0.754	0.553	0.637	0.617	0.623			
GR	Pearson Correlation	0.762	0.556	0.606	0.641	0.618	0.646	0.833		
SI	Pearson Correlation	0.696	0.681	0.523	0.638	0.624	0.696	0.69	0.868	
TR	Pearson Correlation	0.684	0.677	0.525	0.537	0.642	0.646	0.644	0.696	0.844

Appendix 3: Satisfying the assumptions for regression analysis.

Data normality test

The normality of variables can be tested by skewness and kurtosis (Byrne, 1998; Kline, 1998). Zero means there is perfect normality in the data distribution of the variable.

Skewness and Kurtosis Test

Items	Skewness	Kurtosis	Items	Skewness	Kurtosis
EFF 1	-0.34	-0.73	SE 1	0.23	-0.46
EFF 2	-0.35	-0.64	SE 2	0.41	-0.80
EFF 3	-0.14	-0.91	SE 3	0.56	-0.26
EFF 4	0.05	-1.05	SE 4	-0.23	-0.55
EFF 5	-0.21	-0.30	SE 5	0.33	-0.46
EFF 6	0.18	-1.17	SE 6	-0.02	-1.09
EFF 7	-0.21	-0.68	SE 7	-0.23	-0.39
EFF 8	-0.34	-0.66	CC1	0.01	-0.68
EFF 9	-0.01	-0.55	CC2	0.22	-0.62
EFF 10	0.31	-0.10	CC3	0.30	-0.67
EFF 11	-0.04	-0.03	CC4	0.26	-0.40
LI 1	-0.40	-0.92	CC5	0.28	0.20
LI 2	-0.35	-0.41	GR 1	-0.40	-0.21
LI 3	-0.02	-1.15	GR 2	0.15	-0.96
LI 4	-0.74	-0.10	GR 3	0.03	-0.58
NO 1	-0.39	-1.09	GR 4	-0.26	-0.68
NO 2	-0.34	-0.75	GR 5	0.15	-0.97
NO 3	-0.13	-0.97	SI 1	-0.12	-0.90
NO 4	-0.04	-0.31	SI 2	0.00	-0.99
NO 5	0.08	0.23	SI 3	-0.10	-0.91
NO 6	-0.22	-1.09	SI 4	-0.20	-0.30
NO 7	-0.27	-0.88	SI 5	0.06	-0.52
CO 1	0.15	-0.55	TR 1	0.64	0.03
CO 2	0.22	-0.43	TR 2	-0.16	-0.81
CO 3	-0.11	-0.88			
CO 4	-0.02	-0.22			
CO 5	-0.01	-0.58			

Multicollinearity of independent variables

The rule of thumb for the condition index test is that if the value of the condition indexes is greater than 20, there may be collinearity problems in the data (Greene, 2000). Eigenvalues provide an indication of how many distinct dimensions there are in the independent variables. If several eigenvalues are close to zero, then the variables are highly intercorrelated and small changes in the data values may lead to large changes in the estimates of the coefficients. The condition indexes are all smaller than 20, but looking on eigenvalues, dimension 5 seems to have a collinearity problem, as its eigenvalue is close to zero, meaning that there are four main distinct dimensions in the model.

Eigenvalue and condition index results

Dimension	Eigenvalue	Condition indexes
1	1.000	2.042
2	0.285	3.824
3	0.278	3.876
4	0.167	4.992
5	9.880E-02	6.497