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'Hidden' innovation development through inherent and support social capitals: an experimentation in rural tourism

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ABSTRACT

This paper focuses on 'hidden' innovation development in rural tourism propelled by combinations of social capitals. Based on questionnaire data of 147 tourism community enterprises across Thailand, findings disclose three hidden innovations – marketing, supporting process and organizational innovations – which assist the enterprises in commercializing new products and sustaining their competitiveness in new markets. The paper employs factor and hierarchical regression analyses to investigate the effects of types of social capital on the hidden innovations. The newly categorized 'inherent social capital', encompassing levels of collaboration among members and of utilization of business and information networks, breeds marketing and supporting process innovations. The 'national support social capital', embracing degrees of research network utilization and of acquaintance/participation with national development agencies/associations, spawns the three innovations. Policy implications are that social capitals are crucial for broadening the non-technological innovation landscape and that matched categories of social capital are required for augmenting specific types of innovation.

KEYWORDS

Hidden innovation; rural innovation; tourism innovation; rural tourism; social capital; Thailand

1. Introduction

This paper studies social capital and innovation development in rural tourism, a globally growing and attention-grabbing service sector, of which innovation development remains across-the-board under-measured for comparative and quantitative studies. We advance to study broader innovation forms other than conventional product and process innovations – that is, marketing, organizational and supporting process innovations. The former two innovations are reasoned to importantly affect enterprises' sales, market shares and overall performance by advancing new ways of promoting demand-led products, augmenting the quality of organization and work, and improving the exchange and use of knowledge and technology (OECD/Eurostat 2005). The latter has been increasingly recognized to support changes in operation and distribution activities (STI 2009). Although innovations in the service and tourism sectors (mostly product and process innovations) have been studied lately, much work has been done on conceptual, qualitative and individual-case bases (Hjalager 2010; Miles 2010; Djellal, Gallouj, and Miles 2013). Between-enterprise and across –sector quantitative studies on marketing, organizational

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and supporting process innovations remain scant, and community innovation surveys (CIS) on them have been performed only in leading developed countries. Some developed and most developing countries have still reserved them as additions, not standards, for across-the-board innovation surveys and analyses (OECD/Eurostat 2005; STI 2009). The present study with a more-standardized measurement across the rural tourism sector and with all the three types of innovation, though focusing only on the rural tourism sector in Thailand, will hence add to the innovation development literature. It will also extend the body of rural innovation study, which is an important topic in a developing nation but remains scantily investigated (Raffai 2013; Gamito and Madureira 2019). Specifically, we term the three innovations as 'hidden' innovations, following the emerging hidden innovation studies (e.g. NESTA 2007; Stoneman 2007; Miles and Green 2008; Abreu et al. 2010). These studies attempt to annex into innovation studies the measurement, analysis and policy application of additional sources of innovation other than standard research and development (R&D) expenses and human resources and patents and of forms of innovation other than conventional product and process innovations.

As will be elaborated in the second section, the hidden innovations studied here are able to be derived from varieties of social and economic sources apart from traditional R&D elements and patents. Provided social and economic sources of the innovations that could be easier accessed to and with cheaper costs than those connected solely to R&Ds and patents, innovation opportunities for rural tourism enterprises within the range of the hidden innovations have become copious. Strategies and policies targeting to enhance the social and economic sources of the innovations, the protruding of which is the network social capital prevalent in rural areas, are right for innovation supports to the enterprises. For Thailand, a simple report on existing types of innovation and of social capital surrounding cross-country rural community enterprises was documented Patluang 2012), but a higher level of quantitative analysis pertaining to the causal) relationships between different types of social capital and of innovation has not generally been carried out. This study advances further to undertake hypothesis testing of such relationships, chiefly between types of social capital and marketing, organizational, and supporting process innovations. Given potential proliferations of various social capitals and innovations in rural tourism (as well as in certain other service sectors), and potential strategies and policies for making use of the specific relationships between different sorts of them, this study is well reasoned.

To add to the literature, in the third section we will newly conceptualize the effects of two categories of social capital on innovation before having hypothetical tests on them and reporting the quantitative results in the fifth section. Social capital is here defined under the mainstream of social capital literature as all (actual/potential) resources (assets/means) formally and informally *implanted within and obtainable from networks* of more or less institutionalized relationships of individual unit and entity (Bourdieu 1986; Coleman 1988, 1990; Burt 1992; Bourdieu and Wacquant 1992; Nahapiet and Ghoshal 1998). Grounded on the existing social capital literature and science and technical human capital (STHC) literature (e.g. Bozeman, Dietz, and Gaughan 2001; Bozeman and Mangematin 2004) that well observe the importance of social capital for supporting science and technology (S&T) development and innovation, this study is expected to empirically and quantitatively apply the extended concept to the case of Thai rural tourism. Given that social capital is defined above as all resources implanted within and

obtainable from *networks* of individual and entity, it is also founded on R&D and innovation network literature reviewed below. We will hence make use of all three branches of literature in comprehensively conceptualizing the causal effects of different social capitals on innovation below. The across-the-board measurement and study of innovation development, derived from both S&T and other social networks, of community enterprises across Thailand's rural tourism sector are also useful grounds for further studies of innovation development in other comparable sectors and developing countries. Explicitly, the study responds to two research questions. The first is whether types of social capital have statistically significant effects on the development of hidden innovation. The second research question is to what extent, if any, are the effects of specific types of social capital on specific types of the hidden innovations. The two research questions will be responded by this study's quantitative assessment founded on the above spelled-out rationale.

Subsequently, the forth section explicates methodology and data. The fifth section explicates a measurement, factor analysis of latent social capital, hidden innovation and related control variables. Then, sub-hypotheses causally relating the latent social capital to hidden innovation factors are set before being tested by hierarchical regressions. The final section provides a discussion and theoretical and policy implications based on all the above analyses.

2. Measuring proposed hidden – marketing, organizational and supporting process – innovations in rural tourism based on OECD/Eurostat's manual

On the extreme, hidden innovation studies define hidden innovation as classes of non-S&T-based innovation not fully measured by traditional S&T metres, such as standard R&D expenses and human resources and patents (NESTA 2007; Stoneman 2007; Miles and Green 2008; Abreu et al. 2010). Hidden innovation outputs include substantial new ways and techniques to perform organizational and marketing activities and changes (NESTA 2007; Miles and Green 2008). The measurement of hidden innovations hence adds to that of S&T-based innovations in overall innovation measurement, providing a basis for matched and effective strategies and policies to promote both hidden and overall innovations. Given the innovations – especially in service, traditional and creative industries, as well as in some manufacturing and other industries – are hidden from across-enterprise and across-sector standard measurement and analysis, some studies recommend a modification of CIS to account for the specific nature of the surveyed industry where hidden innovation may exist (in our case, the rural tourism sector). Others propose the creation of new sector-specific indicators of the innovation (NESTA 2007; Nordli 2016).

However, for comparative studies and extensions of the hidden innovation notion, a common ground for identifying hidden innovation across sectors is of advantage, even though it may cut off some minor sector-specific sorts of hidden innovation. We propose here to measure and analyse marketing, organizational and supporting process innovations, which have been coincidently measured in some OECD and EU members' CIS following the latest OECD/Eurostat's (2005) OSLO Manual for Collecting and Interpreting Innovation Data. These innovations are enough to reveal additional innovations that are usually hidden in the above mentioned sectors, particularly the rural tourism

sector. The detailed categories of marketing and organizational innovations explicitly put in the OECD's and EU's CIS Harmonized Survey Questionnaire for measurement since CIS 2006 embrace changes to product or service design, changes to marketing methods, launch advertising, market research, new or significantly changed corporate strategy, new management techniques and changes to organization structure. Later, CISs and other surveys, including those in the developing country such as Thailand (STI 2009), have been annexed for measurement supporting process innovation such as changes in distribution and logistics methods and changes in operation supporting methods. Based mainly on functional performance, marketing, organizational and supporting process innovations are comparable across all the sectors. Additionally, the three groups of hidden innovation now standardized by the OECD/Eurostat's (2005) manual are able to be derived from varieties of social and economic sources. Strategies and policies targeting to augment the social and economic sources of the innovations, the prominent of which is the network social capital prevailing in rural areas, are suffice and fitting for innovation supports to enterprises. Below we specifically turn to theories and empirical analyses that may endorse such strategies and policies.

3. Inherent and support social capitals and their hypothetical effects on innovation

The mentioned three branches of literature all accentuate the role of social networks, and both formal and tacit knowledge embedded in the social networks, in supporting the developments of R&D, knowledge and innovation. The STHC literature has integrated external social capital – namely network ties – with other internal resources – including traditional human capital formed by formal education and training, scientific and technical knowledge, craft knowledge, technical skills and tacit knowledge – as sources of STHC, the overall accrued resources or capacities of scientists and technicians (Bozeman, Dietz, and Gaughan 2001). The STHC literature reasons that the broader STHC capacity delivers more productivity and broader research value for individual scientists, research collaborations and institutional research centres and university-industry interactions. In broader networks, STHC includes actors in the technical enterprise using and developing S&T and individuals in firms appropriating knowledge and bringing it to the marketplace (Bozeman and Mangematin 2004). Likewise, the R&D and innovation network literature also begins with the effects on technical progress, productivity and additionally innovation of R&D networks and contracts and other formal knowledge-transfer networks (OECD 1992, 1997). Studies in this fashion have not labelled the networks as social networks or social capital although many parts of them are essentially social phenomena. Along these lines, networks lead to knowledge flows and interactions that are conducive to learning and exploiting knowledge for innovation (Lundvall 1992; OECD 1992; 1997). Most important is related to networks' enabling qualities for searching for, storing and diffusing new knowledge and technologies for innovation development within national innovation systems (Freeman 1987; Lundvall 1992; OECD 1997, 1999b) and regional and local innovation systems (OECD 1996; Camagni 1991; Maskell and Malmberg 1999; Asheim and Gertler 2005) and for interactions between producers and users (Lundvall 1992; OECD 1992) in commercializing and/or overall processes of innovation. In cluster studies (Porter 1990; OECD 1999a; Novelli, Schmitz, and Spencer 2006; Giuliani

2010), informal networks which locate tacit knowledge for innovation are underlined, notably those farther from R&D-based components and closer to spillovers from business alliances and competitors, and interactions with consumers.

The above two lines of literature are then entangled with the network social capital literature, which emphasizes the role of social networks in exchanging and newly combining resources and delivering knowledge exchange and sharing, interactive learning, communication, reciprocity and cooperation that affect innovation. Also, the strength of the social capital framework anchors in its emphasis on both informal networks, and related tacit knowledge and information, and formal networks, and related codified (explicit) knowledge and information, in generating innovation. These tacit and informal attributes are prevalent and mostly accessible with low costs in rural, traditional and service sectors, and can be further uplifted by appropriate incentives and/or supporting policies for stimulating and broadening knowledge and innovation. In the latter literature, different sorts of social capital are generally held to positively affect productiveness, development and innovation while some negative effects and costs of social capital are also recognized (Woolcock and Narayan 2000; Uzzi and Spiro 2005; Rost 2011; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014).

Regarding the effects on innovation, there are theoretically positive indirect impacts on innovation originating from the flow and sharing of information and knowledge through networks. Here, the literature is separated into two parts. The first part emphasizes 'weak' ties (or 'linking' or 'bridging' ties) to external counterparts, a typical 'structural' social capital which involves hierarchical, sparse connectivity of the networks open for flows of various knowledge and information (e.g. Granovetter 1973; Burt 1992; Nahapiet and Ghoshal 1998). The second part underscores 'strong' ties (or 'communal' or 'bonding' ties) to internal counterparts, a typical 'relational' social capital which involves trust and shared norms (overlapping with the above cognitive dimension) as well as good quality of relations through networks that strengthen the knowledge sharing and transformation (e.g. Coleman 1988; Perez-Luno et al. 2011; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014). Combining communal or bonding ties with other dimensions of social capital concerning 'institutions' in the society such as the rule of law and civil liberties as a whole (Putnam 2000), we have 'synergy' dimensions (Evans 1996; World Development 1996; Cooke and Wills 1999; Woolcock and Narayan 2000). Synergy ties between public and private entities with mutually supportive relations (complimentary) or ties that connect public officials to citizens (embeddedness) can enable positive developmental outcomes (Evans 1996). Also, different combinations of bridging ties and state functioning result in different outcomes of economic prosperity (Woolcock and Narayan 2000).

However, to make a contribution to the social capital literature and to make use of the facts found in the preliminary Thai case (Patluang 2012), a case that pointed to two crucial groups of social capital situating in rural areas around representative tourism community enterprises, this study cuts across the above classifications of social capital and focus on the effects of the two groups of social capital on hidden innovation. The first group, which is called inherent social capital, is related to both formal and informal routine transactions of the enterprises through day-to-day business, information exploitation and interactions with customers and suppliers and among themselves. The other group, which is called support social capital, is intermittently developed by purposeful

support services of other linked parties, such as government and non-government agencies, which formally and informally transfer codified and tacit knowledge and/or directly support innovation development to the enterprises. Most important is that the above grouping of social capital is very valuable for respecting policy choices. For inherent social capital, innovation policy regulators are able to only mediate indirectly through incentives and facilitations, which may intensify networking, cohesion and interaction among partners in the enterprises' routine affairs. For support social capital, policymakers are able to add purposeful direct interventions through formal innovation support programmes and agents and/or informal networking and events on top of above indirect mediations.

3.1. Inherent social capital and its positive effect on hidden innovation

Broadly, inherent social capital naturally occurs to enterprises in their routine operations and activities within their organizations and/or within their value chains, based on within-group resources and learning and/or interactions with and advice from suppliers, consumers and other industrial companions. The technological and non-technological, explicit and tacit, knowledge and apprentices useful for hidden innovation development may be obtained as part of formal trade contracts and bargains, but more as informal non-tradable spillovers to the enterprises in their day-to-day business activities. The positive impact of this dimension of social capital on enterprises' innovation has been partly accounted for by the above innovation systems and clusters literature (e.g. Porter 1990; Camagni 1991; Lundvall 1992; OECD 1992, 1996, 1999a; Asheim and Gertler 2005; Novelli, Schmitz, and Spencer 2006; Giuliani 2010). In the social capital literature, this dimension of social capital is made of both bonding and bridging elements. Therefore, the arguments that are made about positive impacts on innovation of proper combinations in complimentary manner of internal (bonding) and external (bridging) and of structural and relational social capitals (Tsai and Ghoshal 1998; Uzzi and Spiro 2005; Capaldo 2007; Rost 2011) are also applied to this case. Based on the synthesis of above branches of literature, we have a general hypothesis to be tested*: Inherent social capital has a positive effect on hidden innovation*.

3.2. Support social capital and its positive effect on hidden innovation

This dimension of social capital is the social capital that brings about support to rural enterprises within the arms of external government and non-government organizations, which partly or fully carry out their general socio-economic development support functions at local and/or national levels. The supporting function here means untraded doings, carried out by the external entities as part of their normal governance or philanthropy missions. A representative enterprise is commonly able to obtain support from this dimension of social capital through varieties (structural dimension) and/or intensities (relational dimension) of their existing networks with, participation in, and/or acquaintances with the external units and/or their representatives, without formal obligation for contributing a return. The positive impact of this social capital on enterprises' innovation has also been pronounced by part of the above innovation systems and clusters literature that focuses essentially on organizations and institutions for innovation

development (e.g. Freeman 1987; Cooke, Uranga, and Etxebarria 1997; OECD 1997, 1999a, 1999b; Maskell and Malmberg 1999; Asheim and Gertler 2005; Novelli, Schmitz, and Spencer 2006). Equally, NESTA (2007) and Miles and Green (2008) point out that hidden innovation mostly comes formally and informally from the support of non-technology policies and from intermediary organizations and 'hinterland' sectors other than those specific technology/innovation development organizations and sectors. In the social capital literature, this dimension of social capital is part of the synergy dimension which combines bridging social capital and state complimentary functioning for positive outcomes (e.g. Evans 1996; Cooke and Wills 1999; Woolcock and Narayan 2000). All of the linked organizations include national and local government agencies, universities and higher educational institutes, research institutes, and non-governmental organizations that, in pursuing their routine socio-economic development functions, may formally and informally support both codified and tacit knowledge and both technical and non-technical apprentices useful for innovation development. Under the STHC literature, scientists and technicians with their ingrained STHC capacity may work for research centres and collaborations supporting rural and related tourism enterprises. Individuals in the enterprises may be appropriate and apply the derived S&T and related knowledge to work and increase productivity (Bozeman, Dietz, and Gaughan 2001; Bozeman and Mangematin 2004). Based on the synthesis of above branches of literature, we hence have another general hypothesis to be tested: *Support social capital has a positive effect on hidden innovation.*

4. Methods and data

4.1. Empirical setting

The representative case of Thai tourism community enterprises

In Thailand, a community enterprise is legally composed of at least 7 individual or household micro enterprises. Almost all the micro enterprises are located in rural areas and network together for mutual and external exchanges and assistance. For the present case, they also represent the micro enterprises in the rural, tourism and service sectors usually having limited capabilities and resources for innovation development. Also, they receive meagre innovation support from conventional science, technology and innovation institutions, which target mostly larger urban firms in the manufacturing sector. However, there are other opportunities for the micro enterprises' innovation, given that certain types of hidden innovation have been preliminarily reported coinciding with varieties of network social capital maintained by the Thai tourism community enterprises (Patluang 2012). Utilizing the review of theoretical effects of social capital on innovation, we may thus use this case to testify the opportunities for extending the innovation development landscape beyond those relying merely on unreachable and costly S&T-related innovation sources onto those founding on more-accessible and lower-cost socio-economic bases. The ways the micro enterprises get together in the form of community enterprise and network and interact with other entities are to be tested for their innovation contributions. The verified evidence is expected to be beneficial not only for advancing support strategies and policies but also for applying to cases of innovation development in other rural, traditional and service sectors in other countries.

Data collection

The data for this study is a five-year update on the previous preliminary survey (Patluang 2012) which was first carried out under a project supported by the National Research Council of Thailand's (NRCT) fund. The update is mainly for monitoring and reporting innovation changes. In 2012, a cross-country sample of 178 out of the total population of 345 tourism community enterprises registered with Thailand's Ministry of Agriculture was randomly chosen to complete six-paged questionnaires on their social capitals, innovations and knowledge bases, with the margin of error approximating 5.2%, gauged by Yamane's (1967) formula for determining sample size. The update occurred between November 2017 and January 2018, with a sample size of only 147 out of the previous 178 tourism community enterprises available to provide the data, thereby making the margin of error increase to about 6.25%. The data on social capitals, innovations and knowledge bases of the community enterprises cover what had happened within five years before the collection. With the practicable value of the data and the rising importance of the hidden innovation issues, we may uplift their usefulness in higher levels of theoretical and policy analyses here.

4.2. Preliminary measures

Hidden innovation variables

Along the lines of OECD/Eurostat's (2005) manual and CIS and other extended surveys, including those of STI (2009), the hidden innovation variables measured here include: *new product characteristics and packaging, new distribution techniques and channels, new promotion and advertising techniques, new price techniques*, *changes in business strategy, new management techniques*, *changes in operation supporting method* and *changes in distribution and logistics methods.* The value the representatives of the community enterprises required to report for each of these hidden innovations is either 1 (have) or 0 (have not).

Social capital variables

Somewhat adapted from the original terminology and measurement scales used in regional innovation surveys by Uphoff (2000) and Landry, Amara, and Lamari (2002), the social capital variables measured here are more oriented towards the network dimensions of innovation and the social capital dimensions other than the cognitive dimension. The multi-item measures include: *the degree of collaboration within the community enterprise, the level of business network utilization*, *the level of information network utilization*, *the level of research network utilization*, *the degree of acquaintance with representatives of national development agencies*, *the degree of participation in associations and networks at the national level*, *the degree of acquaintance with representatives of local development agencies* and *the degree of participation in associations and networks at local level.* The survey questions and scales related to these measures are detailed in Table 1.

Controlled variables

Providing that the *size* and *age* of enterprises may have differentiated effects on innovations, we also measure and use them as control variables. In complying with the literature, the number of members of the enterprises in natural logarithm form and their years in operation will be employed respectively as measures for size and age (Molina-Morales

Table 1. Social capital measures and related survey questions.

Social capital measures	Related survey questions
Scale: N0 = 0; Yes = 1	
Degree of collaboration within the community enterprise	Do members of the community enterprise interact and cooperate strongly?
Scale: Low = 1; Fair = 2; Slightly High = 3; High = 4	
Level of business network utilization	To what extent does the community enterprise exploit relationships with customers, suppliers, co-investors, competitors, and the like?
Level of information network utilization	To what extent does the community enterprise utilize information networks such as internets, presses, exhibitions, and the like?
Level of research network utilization	To what extent does the community enterprise make use of relationships with research institutes, universities, higher educational institutes, and the like?
Degree of acquaintance with representatives of national agencies	How often does the community enterprise contact agents of government departments and non-government organizations at the national level?
Degree of participation in associations/ networks at national level	How often does the enterprise join meetings, associations and networks connected to national government departments and non-government organizations?
Degree of acquaintance with representatives of local agencies	How often does the community enterprise contact agents of government departments and non-government organizations at the local level?
Degree of participation in associations/ networks at local level	How often does the enterprise join meetings, associations and networks connected to local government departments and non-government organizations?

and Martinez-Fernandez 2010; Perez-Luno et al. 2011; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014). Additionally, we take in knowledge-based variables as control variables, given their indispensable roles in innovation development (OECD 1992; OECD/Eurostat 2005; Fagerberg, Fosaas, and Sapprasert 2012). Based on OECD/Eurostat (2005), the knowledge-based variables measured include *investment in tools and machinery, investment in information and communication technology, training, product design activity*, and *R&D*. Their values are reported either as 1 (have) or 0 (have not). To reflect the role of knowledge networking, we add other related variables, including: *the level of systematic knowledge transfer, the level of informal knowledge transfer,* and *the level of through-training knowledge transfer*, of which the values are to be reported to reveal the strength within the range of 1 (low) to 4 (highest) on the Likert scale.

4.3. Analytical methodology

With limited space, we skip descriptive analysis and directly pursue a measurement, factor analysis on all the multi-item measures. These are carried out to obtain data-generated latent variables, each of which represents each category of hidden innovation, social capital and related control variables. The step is to cope with excessively many variables which may also cause multicollinearlity in following regression analyses, as well as to obtain discriminant validity and convergent validity (Perez-Luno et al. 2011; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014; van Hemert, Nijkamp, and Masurel 2013). In doing so, we will also monitor that the resultant latent factors be consistent with theoretical grounds of the variables. Finally, we will regress the derived innovation variables on the social capital and related control variables to find their causal relationships. Note that hierarchical regressions will be applied to measure additional variance of hidden innovations that may be explained by social capitals. These will be done by

entering the control variables in the first step and the social capital variables in the second and then tracing the change in multiple-squared correlation coefficient (R^2) and its significance level. These will add to the regular regression coefficients of social capital variables in testing the sub-hypotheses below.

5. Results

5.1. Measurement analysis

Firstly, the above measures are tested for sampling adequacy. It is guaranteed by the fact that the obtained Bartlett's test of sphericity for the variables is significant at the 0.01 level and the value of Kaiser-Meyer-Olkin measure of sampling adequacy is 0.762, higher than the required minimum value of 0.700 suggested in the literature (Palmberg 2004). Ensuing, the Cronbach's alpha values of 0.695, 0.758 and 0.711, for the multiple-item knowledge base, social capital and hidden innovation scales, respectively, guarantee the validity of aggregation being within the limits of tolerance pointed out in the literature Malhotra 1997; Molina-Morales and Martinez-Fernandez 2010). Furthermore, Table 2) illustrates on its cells all the factor loadings, which result from an exploratory factor analysis to generate discriminant validity and convergent validity (Perez-Luno et al. 2011; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014). This is done by utilizing principle axis factoring, selecting factors with eigenvalues greater than one, and running a varimax rotation. The second, third and fourth columns of the table each denotes a latent factor in which each variable along the row with the factor loading **in bold** constitutes the component of that latent factor, given that its factor loading with other factors (in other columns) is smaller. In each constructed factor in Table 2, all its elements in bold has a standardized factor loading value of at least 0.455, which is sufficiently high (more than 0.3) by social and behavioural science standards (Merenda 1997; Hair et al. 1998; van Hemert, Nijkamp, and Masurel 2013).

For the part of hidden innovation latent variables in Table 2, the second, third and fourth columns denote 'marketing innovation', 'supporting process innovation' and organizational innovation' factors, respectively. They are the result of data-generating' but are also conceptually consistent. The 'marketing innovation' factor includes within it new product characteristics and packaging, new distribution techniques and channels, new promotion and advertising techniques, and new price techniques. The 'supporting process innovation' factor embraces change in the operation supporting method and change in the distribution and logistics method. Lastly, the 'organizational innovation' factor comprises change in business strategy and new management techniques.

For the part of social capital latent variables in Table 2, the second, third and fourth columns denote 'inherent social capital', 'national support social capital' and 'local support social capital' factors, respectively. Consequently, we now divide the support social capital into two dimensions. The inherent social capital factor contains the collaboration within the community enterprise, the utilization of business network and the utilization of information networks. This statistical result is consistent with the above reviewed concepts, including both those related to innovation systems and clusters literature and those related to the bonding and bridging social capital literature. In detail, the degree of collaboration within the community enterprise and the utilizations of business

Table 2. Factor analysis for latent variables.

Social capital latent variables: (Factor loading in bold; cumulative variance explained = 63.01 percent)	Inherent social capital	National support social capital	Local support social capital
Degree of collaboration within the community enterprise	**.686**	−012	.109
Level of business network utilization	**.830**	.069	.047
Level of information network utilization	**.485**	.255	−.055
Degree of acquaintance with representatives of local agencies	−.043	.014	**.903**
Degree of participation in associations/networks at local level	.171	.237	**.850**
Degree of acquaintance with representatives of national agencies	.172	**.828**	.029
Degree of participation in associations/networks at national level	.113	**.837**	.112
Level of research network utilization	.017	**.686**	.140
% of variance explained	18.35	24.79	19.87
Knowledge base latent variables: (Factor loading in bold; cumulative variance explained = 63.17 percent)	Basic knowledge base	Extended knowledge base	Training
R&D activity	**.779**	.178	.305
Investment in tool and machine	**.761**	.055	.080
Investment in information and communication technology	.174	**.618**	.090
Product design activity	.321	**.531**	.185
Level of systematic knowledge transfer	.148	**.608**	.272
Level of informal knowledge transfer	.174	**.736**	.090
Training activity	.003	.071	**.855**
Level of through-training knowledge transfer	.083	.416	**.751**
% of variance explained	20.45	22.10	20.62
Hidden innovation latent variables: (Factor loading in bold; cumulative variance explained = 62.08 percent)	Marketing innovation	Supporting process innovation	Organizational innovation
New product characteristics and packaging	**.829**	.115	.010
New distribution techniques and channels	**.563**	.359	.082
New promotion and advertising techniques	**.564**	.238	.263
New price techniques	**.455**	.190	.268
Change in business strategy	.001	.112	**.961**
New management techniques	.036	.073	**.957**
Change in operation supporting method	.074	**.847**	.070
Change in distribution and logistics method	.179	**.733**	.116
% of variance explained	22.77	22.25	17.06

and information networks can be naturally pursued by any enterprise with internal and external links.

Subsequently, the national support social capital factor contains the utilization of the research network, the degrees of acquaintance with representatives of national-level development departments and non-government organizations, and the participation in the associations and networks of national-level development departments and non-government organizations. This statistical result is also consistent with the theoretical notions in Section 3, both those related to the national innovation system literature and those related to the synergy social capital literature. In particular, the national support social capital is obtainable within a centralized developmental state expanding varieties of its national agencies across country to govern and support socio-economic development, and/or obtainable when national-level non-government organizations expand their philanthropic and socio-economic development function across country. Based on the preliminary Thai case, just as in most cases of developing and some cases of developed

countries, research network utilization can be considered a support social capital, given that normally rural micro and/or community enterprises cannot afford creating their own-research networks among themselves or with other business counterparts, but rather receiving supported research from bridging and synergy networks. Here, STHC literature also applies. For the Thai case, these supported research networks embrace those from national-level S&T-related institutions, as well as other non-S&T organizations Patluang 2012). Finally, the local support social capital factor contains the degrees of) acquaintance with representatives of local entities and the participation in the associations and networks of local entities. The statistical result is also in line with the above reviewed concepts, both those related to the above regional and local innovation systems literature and those related to the social capital literature emphasizing the concept of embeddedness at the local level.

Similarly, we have three knowledge-based factors termed 'basic knowledge base', containing conventional R&D activity and investment in tools and machines, 'extended knowledge base', covering product design activity and levels of informal and systematic knowledge transfers, and 'training', comprising training activity and the level of through-training knowledge transfer. The basic knowledge base factor is generally targeted within the traditional S&T innovation policy. The extended knowledge base factor is more complex. For the community enterprises, they require internal and external interactive networks for extending it beyond their routine uses of basic knowledge (Patluang 2012). The training factor, whether own-generated or supported, is uncomplicated but specifically important in generating non-technological innovations and typical innovations in the service sector (OECD/Eurostat 2005; NESTA 2007; Miles and Green 2008; Miles 2010). Finally, we put all these indispensable knowledge-based factors together with size and age variables as control variables.

With the derived three hidden innovation and three social capital factors, we now have nine sub-hypotheses to be tested for their relationships:

H1: Inherent social capital has a positive effect on marketing innovation.

H2: National support social capital has a positive effect on marketing innovation.

H3: Local support social capital has a positive effect on marketing innovation.

H4: Inherent social capital has a positive effect on supporting process innovation.

H5: National support social capital has a positive effect on supporting process innovation.

H6: Local support social capital has a positive effect on supporting process innovation.

H7: Inherent social capital has a positive effect on organizational innovation.

H8: National support social capital has a positive effect on organizational innovation.

H9: Local support social capital has a positive effect on organizational innovation.

5.2. Hierarchical regression analysis

As revealed in Tables 3–5, hierarchical regressions of marketing, supporting process and organizational innovation factors, respectively, on control variables and social capital

Table 3. Hierarchical regression of marketing innovation on social capital variables.

	Marketing innovation	
Dependent variable:	Model MAR1	Model MAR2
Control variable		
Number of members	−0.920	−0.088
Year in operation	0.017	0.025
Basic knowledge base	0.064	0.021
Extended knowledge base	0.288***	0.291***
Training	0.186**	0.192**
Social capital variable		
Inherent social capital		0.454***
National support social capital		0.319***
Local support social capital		0.232***
R^2	0.125	0.323
Adjusted R^2	0.091	0.280
Change in R^2	0.125	0.198
F	3.657***	7.454***
F for the Chang in R^2	3.657***	12.184***

*Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

factors are undertaken by entering the control variables in the first step, resulting in Model MAR1, Model SUP1 and Model ORG1, respectively, and the social capital latent variables in the second step, resulting in Model MAR2, Model SUP2 and Model ORG2, respectively. The *F*-statistic values for all the models are significant at the 0.01 level, signifying a level of goodness of fit. Importantly, the changes in multiple-squared correlation coefficient (R^2) for Model MAR2 and Model SUP2 from those for Model MAR1 and Model SUP1 (resulting from adding in the group of social capital variables) are attested by F for the Change in R^2 significant at the 0.01 level. This endorses significant contributions of social capitals to the marketing and supporting process innovations as well as better goodness of fit of Model MAR2 and Model SUP2 over Model MAR1 and Model SUP1. However, the change in multiple-squared correlation coefficient (R^2) for Model ORG2 from that for Model ORG1 is not significant, not validating the contribution of the whole group of social capitals to organizational innovations.

Table 4. Hierarchical regression of supporting process innovation on social capital variables.

	Supporting process innovation	
Dependent variable:	Model SUP1	Model SUP2
Control variable		
Number of members	−0.068	−0.076
Year in operation	−0.070	−0.064
Basic knowledge base	0.232***	0.193**
Extended knowledge base	0.291***	0.285***
Training	0.272***	0.242***
Social capital variable		
Inherent social capital		0.226**
National support social capital		0.302***
Local support social capital		0.104
R^2	0.211	0.322
Adjusted R^2	0.180	0.279
Change in R^2	0.211	0.111
F	6.827***	8.437***
F for the Chang in R^2	6.827***	11.900***

*Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Table 5. Hierarchical regression of organizational innovation on social capital variables.

	Organizational innovation	
Dependent variable:	Model ORG1	Model ORG2
Control variable		
Number of members	−0.024	−0.018
Year in operation	−0.002	0.002
Basic knowledge base	0.105	0.077
Extended knowledge base	0.291***	0.179**
Training	0.232**	0.162*
Social capital variable		
Inherent social capital		0.146
National support social capital		0.223**
Local support social capital		0.079
R^2	0.185	0.223
Adjusted R^2	0.153	0.173
Change in R^2	0.185	0.038
F	5.821***	4.488***
F for the Chang in R^2	5.821***	2.031

*Significant at the 0.10 level; **Significant at the 0.05 level; ***Significant at the 0.01 level.

Specifically, in Model MAR2 the variables significantly effecting the marketing innovation at the 0.05 or 0.01 level of significance include all three social capitals, training and extended knowledge base. Thus, hypotheses H1, H2 and H3 all are supported. In this context, the relative effects on the innovation of inherent social capital and national support social capital surmount those of extended knowledge base and training, with their standardized coefficient values of 0.454 and 0.319 higher than those of the latter two of 0.291 and 0.192, respectively. With its standardized coefficient value of 0.232, the strength of effect of local support social capital on the innovation falls between those of the two knowledge base variables. In Model SUP2, the variables significantly effecting supporting process innovation at the 0.05 or 0.01 level of significance include inherent and national support social capitals and all the three knowledge base variables. This time only hypotheses H4 and H5, not H6, are supported. With its standardized coefficient values of 0.302, the relative effect on the innovation of national support social capital remain stronger than those of the extended knowledge base, training and basic knowledge base, of which their standardized coefficient values recorded at 0.285, 0.242 and 0.193, respectively. With its standardized coefficient value of 0.226, the strength of effect of inherent social capital on the innovation falls within those of the knowledge base variables.

Although Model ORG2 in Table 5 does not endorse the effect of the overall group of social capitals on organizational innovation, the *F*-statistic value for Model ORG2 itself is proved significant at the 0.01 level, allowing a degree of fitness of the model for utilizing and comparing the estimates of the effects on the innovation of all statistically significant independent variables. Here, the variables significantly effecting organizational innovation at the 0.10 or 0.05 level of significance include national support social capitals, extended knowledge base and training. This time only hypothesis H8, not H7 and H9, is supported for its effect on organizational innovation. With its standardized coefficient values of 0.223, the relative effect on the innovation of national support social capital remains stronger than those of the extended knowledge base and training, of which their standardized coefficient values are recorded at 0.179 and 0.162, respectively.

6. Discussion and implications

The above findings respond to the research questions as follows. All bundles of network social capital – statistically collected and composed from the experimentation in the Thai rural tourism sector – have statistically significant effects on the development of certain hidden innovations – marketing, supporting process or organizational innovation – of the Thai rural community enterprises. To the greatest extent, the national support social capital provides the strongest significant positive effects on all the three innovations, usually hidden from across-the-board and quantitative measurements and analyses for the rural tourism sector. Statistically, national support and inherent social capitals supersede knowledge-based variables, such as extended knowledge base and training in providing positive effects on marketing innovation. National support social capital also overtakes all the knowledge-based variables in providing positive effects on supporting process innovations while inherent social capital averagely pairs with them. In this latter case, local support social capital has an insignificant effect. Lastly, national support social capital supersedes extended knowledge base and training in providing positive impacts on organizational innovation.

The statistically significant effects on rural tourism's hidden innovations of two newly conceptualized categories of network social capital empirically and quantitatively further the literature that well observe the importance of social capital for supporting innovation. The resulted impacts of the national support social capital – consisting of the level of research network utilization, the degree of acquaintance with representatives of national development agencies and the degree of participation in associations and networks at the national level – underscore the roles of STHC capacities (Bozeman, Dietz, and Gaughan 2001; Bozeman and Mangematin 2004), of the synergy dimension which combines bridging social capital and state complimentary functioning (Evans 1996; Cooke and Wills 1999; Woolcock and Narayan 2000), and of network-embedded organizations and institutions for innovation development (Freeman 1987; Cooke, Uranga, and Etxebarria 1997; OECD 1997, 1999a, 1999b; Maskell and Malmberg 1999; Asheim and Gertler 2005; Novelli, Schmitz, and Spencer 2006). Here, the specific network social capital diffuse – through formal research support and informal activity participation and acquaintance – resources and knowledge embodied in human capital and ingrained in organizations and institutions for innovation developments of the community enterprises. On the part of organizations and institutions, this study quantifies the qualitative analysis of Patluang (2012) which reports that Thai tourism community enterprises develop innovations based on general development supports from national government agencies in the Ministry of Industry, Ministry of Commerce, Ministry of Agriculture and Cooperatives, and Ministry of Tourism and Sports, apart from formal research institutes.

Likewise, the resulted impacts of the inherent support social capital – comprising the degree of collaboration within the community enterprise, the level of business network utilization and the level of information network utilization – highlight the effects on innovation developments of within-group and/or within-value-chain resources, formal and informal learning and/or interactions with and advices from suppliers, consumers and other industrial companions under the innovation systems and clusters literature (Lundvall 1992; Porter 1990; Camagni 1991; OECD 1992, 1996, 1999a; Asheim and Gertler 2005;

Novelli, Schmitz, and Spencer 2006; Giuliani 2010) as well as of combinations in a complimentary manner of internal (bonding) and external (bridging) and of structural and relational social capitals (Tsai and Ghoshal 1998; Uzzi and Spiro 2005; Capaldo 2007; Rost 2011).

Strategically for the enterprises, marketing and supporting process innovations are principal targets for development based on social capital, and inherent and national support social capitals are key instruments for that purpose. Compared to basic knowledge base, which comprises own R&D activity and investment in tool and machine and contributes to only supporting process innovation, national support social capital is more effective, and potentially with lower costs where national-level government and non-government organizations continue to expand their general socio-economic development function. Policy implications from the findings include that policymakers may attempt to expand overall networks of general socio-economic development functions across country and sectors. In detail, formal and informal research, development and other networking, meetings and associating with targeted enterprises should be expanded along with direct innovation support programmes, to increase the levels of participation and acquaintances among national government and non-government agents and enterprise members, as well as the level of research utilization by the latter. Furthermore, incentives and facilitations to create networking, such as the support for the formation of community enterprises, and those to intensify cohesion and interaction among partners in the enterprises' routine affairs can also be extended to indirectly stimulate inherent social capital that potentially contributes to hidden innovations.

Additionally, this study holds up and extends the measurement and utilization of functional marketing, supporting process, and organization innovations explicated in the second section as core hidden innovations for comparative studies across sectors and countries. Given that the hidden innovations in this study are also rural and tourism innovations, the findings about their sources, forms, and related strategic and policy implications contribute to the literature in all the related fields, as well as the potential theoretical and empirical applications to other similar areas, such as traditional and service sectors, and other countries. It hence endorses extending OECD/Eurostat's OSLO Manual used here for measuring the hidden innovations in rural tourism, as well as in other traditional and services sectors.

Respecting limitations, this study builds on the compound latent factors, which sacrifice examining on individual, not equal, impacts of each variable within the factor. Further path and/or structural analyses could thus be supplemented, although some of the variables may be also omitted and traded off by these latter methods. Also, given specifically-designed measures and data collection, this study focuses solely on *network* dimension of social capital, investigations on specific cognitive dimension of social capital – such as trust, norm and shared vision (Moran and Ghoshal 1996; Tsai and Ghoshal 1998; Cuevas-Rodriguez, Cabello-Medina, and Carmona-Lavado 2014), institutional dimension of social capital concerning rule of law and civil liberties (Putnam 2000), and internal human capital dimension of STHC (Bozeman, Dietz, and Gaughan 2001; Bozeman and Mangematin 2004) are recommended for further comparable studies.

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