

Sechi, Guido; Skilters, Jurgis; Selecka, Marta; Berzina, Krista; Brice, Liva

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The Impact Of Hybrid Infrastructure On Trust, Motivation And Knowledge Sharing In An Intentional Community: A Latvian Case Study

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THE IMPACT OF HYBRID INFRASTRUCTURE ON TRUST, MOTIVATION AND KNOWLEDGE SHARING IN AN INTENTIONAL COMMUNITY: A LATVIAN CASE STUDY

Guido SECHI^{1,2}; Jurgis SKILTERS²; Marta SELECKA²; Liva BRICE²; Krista BERZINA².

1 Department of Civil, Environmental, Territorial, Building Engineering and Chemistry, Technical University of Bari (Italy)

2 Center for the Cognitive Sciences and Semantics, Faculty of Social Sciences, University of Latvia, Riga (Latvia)

Abstract

The present paper is aimed at investigating the effect that the co-existence of physical and virtual networking has on social assets building and knowledge sharing among members of an intentional community (in particular, the National Library of Latvia users' community). The theoretical framework draws on social and cognitive science, combining social capital theory, social learning theory, social field theory, and theories of collective and collaborative action in cognitive social science. The hypothesized theoretical model relies on a complex taxonomy of social capital and shareable knowledge. The empirical analysis is carried out by means of structural equation modelling for ordinal variables. In order to compare the effect of physical and virtual networking, the model is tested for clusters of community members according to: a) preferences for either ways of networking; b) age; c) personal income. Results for the general sample show a good adherence to hypotheses, plus the unexpected effect of motivation on knowledge growth. Sensitivity analysis provides with a more blurred picture, since results appear very sensitive to hypothesized control variables.

Keywords: social capital; social learning; knowledge sharing; structural equation modelling; micro scale analysis

Introduction

Communication channels determine not only the communication content but also the relationships between the agents and the psychological significance of communication content, format, channels and the agents involved in the act of communication. A typical community of the 21st century is a hybrid community, i.e., community with both digital and physical (e.g., face-to-face) links complementing and influencing each other. The aim of the current paper is to explore the structure and patterns of information and knowledge transfer in hybrid communities. In using a powerful quantitative framework (structural equations' modeling in the Social Capital framework) a complex hybrid community is empirically explored.

Importantly three different relations between physical and digital communities in the light of current development of community channels have to be considered: (1) digital communities are substituting the communities of physical co-presence; 2) digital and physical communities are complementary – they do not replicate each other but generate a specific kind of community – hybrid community, 3) the same users belong to both digital communities and physical communities without generating a specific community consisting of both and integrating both. In our study we were able to show that the second kind of relationship is primary. The first option cannot be observed because of the fact that digital communities are structured according to the social principles of physical communities (Nass, Fogg, & Moon, 1996; Nass, Steuer, & Tauber, 1994; April, Nass & Reeves, 1996), the third option cannot be empirically justified – instead of digitally-physically spitted communities there are communities integrating both physical and digital links of communication and generating some specific modes of communication characteristic only to this kind of community (hybrid community). While the cognitive benefits of hybrid communities are widely emphasized (especially in the tradition by Barry Wellman cp., Hampton and Wellman, 2003, Rainie & Wellman, 2012), the nature of cognitive benefits in hybrid communities is less clear in

respect to different kinds of communication patterns. The efficiency of complementing geographical co-occurrence with digital co-occurrence does not say anything about the sense of belonging and trust. Some prominent critiques (e.g., Camagni & Capello, 2005) emphasize the lack of social trust and sense of belonging in virtual communities. Even though Camagni & Capello critique concerns digital communities, it is important to consider this aspect also in hybrid communities. Worth mentioning that there are only few studies focusing on hybrid (instead of digital or physical) communities, e.g. Gaved & Mulholland (2005).

In community studies, there is consensus among scholars about the strong predicting role of social assets for the effectiveness of knowledge and information exchange in communities. It is acknowledged that digital communication technologies have had a modifying impact on the concepts of neighbouring, proximity, and social capital (Hampton and Wellman, 2003).. This has led to a rich interdisciplinary debate about the extent to which online, virtual communities can be substitutes for traditional, geographical, face-to-face ones with regard to the reproducibility of social assets. Such an issue has several implications. One of the most relevant and debated topics is related to the cognitive benefits of virtual networking. An effective impact of non-geographical channels on knowledge sharing would imply the independence of knowledge from geographical co-occurrence (geographical location of regions and boundaries), with relevant socio-economic consequences. Such an issue is, however, controversial. Critiques (e.g., Camagni and Capello, 2005) argue that knowledge exchange and innovation growth based on global virtual channels (ICTs) are limited by lack of social trust and sense of belonging in virtual communities. Indeed, a key issue is the possibility to reproduce in virtual social environments those social assets which are embedded within geographical communities and physical networks. In other words, the issue amounts to investigating whether a virtual community can reproduce the main features of a *community of practice* – from the point of view of social assets which are embedded in networks and the consequent cognitive benefits of such assets. Next to it, a reflection on cognitive assets and the obstacles to their access is needed. This requires a careful taxonomy of involved factors and an effective cross-fertilization of social and cognitive science threads.

The present paper is an attempt at investigating the effectiveness of knowledge exchange in a mixed physical-virtual environment, rarely investigated in literature – a *hybrid community*. The approach is based on sociology and social psychology threads (social capital and social cognitive theory) and on epistemological reflections on the nature of knowledge and its inherent barriers to sharing. A quantitative approach is adopted for the empirical analysis, based on structural equation modelling (Joreskog and Sorbom, 1979) to be carried out at the *micro* (individual) level.

The proposed model (tested in a preliminary version in Sechi et al., 2013) hypothesizes a positive effect of cognitive proximity on trust, community identity, and hence on the quality of knowledge exchange, which should enhance in its turn the growth of individual knowledge. In general, the current study hypothesizes that the interaction between online and offline communication significantly extends and enhances social interactions in particular and cognitive processing in general.

A quantitative approach is adopted for the empirical analysis, based on structural equation modeling (Joreskog and Sorbom, 1979) to be carried out at the *micro* (individual) level.

Towards a definition of community

A comprehensive and unifying definition of what counts as a community in general, and an epistemic community (community of shared knowledge) in particular, is still lacking. We argue that what is common to all kinds of communities are:

(a) **Collections of associative links, nodes, themes**, whereby links and nodes can refer to both human and artificial agents (such as knowledge repositories, e.g., libraries). In case of online communities, communicative links and nodes lack a physical or geographic co-occurrence.

(b) **Interaction structures**, implicit or explicit shared norms and shared principles of behavior, support / feedback cycle, and shared goals,

(c) Impact of **technical infrastructures** and format- or channel-specificity.

Communities both in physical and virtual sense have an **epistemologically distinct concept of agency**. Sense of belongingness and sharing joint goals generate a “we-identity” and “we-intentionality” of communities (cp. discussion on shared intentionality and agency: Gilbert, 2004, Tomasello, 2009, Searle, 2008). Such a conception of community is highly compatible with some recent approaches (such as Cooke, Gorman, Myers, & Duran, 2013) emphasizing the collective agency and shared cognition (or: team cognition) as a dynamic, highly context-dependent and process-based, community-level phenomenon.

Further, if we look at the level of individuals composing the communities, we can explore different mutually interacting groups of factors: (a) the internal experience-based factors of the subject (beliefs, goals, norms), (b) representation of significant others as a part of self-representation (Saribay and Andersen, 2007), and (c) functionally important parts of the environment the agent is involved in and interacts with (Clark, 2011, Menary, 2010, Wilson, 2004).

Hybrid communities

Hybrid communities are communities which incorporate both physical and virtual communication linkages (Gaved and Mulholland, 2005) and are characterized by framed interactions (Koch, 2005) (a notable exception to this view is Wellman and Milena, 1999). In such communities, network infrastructure consists of both online and offline linkages; physical (offline) and digital (online) relationships generate a complementary structure where online links often support offline relationships and vice versa. Hence, it can be assumed that hybrid communities overcome shortcomings, which characterize pure online and pure offline communities.

At the individual level, the infrastructural features of hybrid communities have crucial consequences for the conception of the self. On the one hand, physical face-to-face communication generates an extended conception of self because of including representation of significant others in the representation of the self (Saribay & Andersen, 2007, Brewer, 1991, Brewer and Gardner, 1996). On the other hand, digital, computer-mediated communication generates a cognitive extension as well – functionally significant links and nodes used in knowledge transfer are a part of the extended conception of the self, supporting the second-wave extended mind paradigm (Clark, 2011, Menary, 2010, Wilson, 2004).

Further, hybrid communities raise questions related to the epistemological agency, belongingness and feeling a collective identity with the community: although an answer to this question is outside of the empirical scope of the results of the present paper, we could generalize that hybrid communities possess collective cognitive states enabled by the belongingness of the individuals involved. According to the seminal framework by Gilbert (2004, p. 96) there are two main collective cognitive states: (a) cognitive states that characterize established communities or groups and (b) cognitive states of “two or more people without any presumption that they constitute an already established group.” Perhaps, at the individual level there are some members of communities possessing different or even incompatible opinions, but sharing the same attitude or opinion if explored at the community level. Collective cognitive states generate beliefs that are based on joint commitment: “A *population, P*, believes that *p* if and only if the members of *P* are jointly committed to believe [...] that *p*.” (Gilbert, 2004, p. 100). Although we are not able to provide empirical evidence for the joint commitment thesis, we argue that the hybrid communities possess it.

Field theory

According to the Field theory (Lewin, 1936, 1951) social behavior can be derived from functionally relevant concrete and coexisting situational and experiential factors constituting a goal-oriented relational socio-cognitive structure where the constituent parts depend on other parts and on the overall structure (a mereological Dynamic Field). Experiential factors (psychological environment) are constrained by situational factors and vice versa. Thus, cognitive environment of an individual is present-oriented (is perceived as phenomenally *given as it occurs* to an agent) and includes both physical places agent is using in everyday activities, and also non-physical spaces

(e.g., virtual, imaginary, counterfactual, and digital spaces, if using the contemporary terminology). Different regions of cognitive environment (or Life Space if using Lewin's terminology) have different strength and importance of connections and barriers. Finally, behavior within Lewinian framework is defined as a function of the subject and the environment (situation): $B = f(P, E)$, where P is a person (subject), E is an environment (situation), B a mental event represented by a behavior (Lewin, 1936, 11, 12, 30, 166, for a compatible view of semantics cp. Skilters, 2004, 2011). This means that the dynamics of momentarily situation together with the experiential dynamics of the agent determine the behavior.

Social capital concept

Social capital is an umbrella term encompassing the different kinds of social assets which can enhance agents- and / or community-related benefits (Bourdieu, 1986; Coleman, 1988; Putnam, 1993) and which are embedded within the various (vertical / horizontal, physical / virtual) patterns of social interaction and networking among and between individuals. In some domains of organizational science, cognitive benefits of social capital have been studied, i.e. social capital has been adopted as a conceptual and analytical tool in order to study knowledge exchange and enrichment among and between individuals and groups, at different levels of analysis. In this context, Nahapiet and Ghoshal (1998) have proposed an influential taxonomy of social capital, identifying three main dimensions: a) the structural part (the whole of network linkages), which has an enabling effect to the access to parties for knowledge exchange; b) the relational part (trust, shared norms) which fosters motivation to exchange knowledge; c) the cognitive part (shared vision, language, codes, narratives) which enables combination capability.

Physical and virtual communities: social assets and cognitive dynamics

The study of virtual communities from the point of view of the reproducibility of social assets which are observed and relevant in physical / geographical communities – and their consequent capability to enhance, among other effects, virtuous cognitive dynamics - is widespread in sociology and organizational science (Rheingold, 1993). Social capital-based community studies and organisational studies widely describe the nature of such social assets. Authors generally agree about the reproducibility of trust as the key factor behind knowledge and information exchange. In geographical community studies, trust is meant as one of the main social assets which lead to socio-economic development (Putnam, 1993). In terms of social capital taxonomy, trust is one of the main components of relational capital – that is, the set of assets which are embedded within linkages and networks (meant as structural capital). Ridings, Gefen and Arinze (2002) state that trust enhances information sharing in virtual communities; trust is in its turn enhanced by perceived responsive relationships, disposition towards trust, belief that others confide personal information. Usoro, Sharratt, Tsui and Shekhar (2007), too, state that trust is an antecedent for knowledge sharing.

In social capital-based cognitive studies, however, the structural / relational dichotomy has been deemed insufficient to describe all relevant aspects of social capital with regard to knowledge exchange and transfer effects. As mentioned above, an enriched taxonomy has been proposed, in the field of organisational science, by Nahapiet and Ghoshal (1998) who, as mentioned above, add a cognitive component representing the mutual compatibility of agents with regard to shared vision, culture, language. Such a component echoes similar concepts in both organizational and regional studies focusing on intra- and inter-firm knowledge transfer dynamics: the idea of 'relative absorptive capacity' as the pre-condition for inter-unit transfer (Lane and Lubatkin, 1998) and the identification of a cognitive dimension of proximity in Boschma's seminal taxonomy study (2005).

Chiu, Hsu and Wang (2006) empirically study the effect of social capital and personal motivation on knowledge sharing in virtual communities, combining Nahapiet and Ghoshal's taxonomy of social capital and Bandura's social cognitive theory (1989). Cognitive social capital, community expectations, and trust are found to affect exchange quality; structural social capital, norm of reciprocity and identification, and community expectations affect exchange intensity.

The issue of inner barriers: the nature of knowledge

Quite surprisingly, social capital studies investigating knowledge transfer dynamics rarely attempt an epistemological discourse and discriminate between different forms of knowledge. Such a lack of attention towards such an issue is surprising since it is relevant for two main reasons. First of all, since Nonaka's studies on organisational learning (1991; 1994) it is acknowledged that information and knowledge are two distinct concepts, which may follow different social learning patterns (Inkpen and Tsang, 2005). Second, although most debates on the social exchange of knowledge, as evident from the previous paragraphs, are focused on the interaction of agents and their social linkages (of an affective and cognitive nature), which are reflected in the relational and cognitive dimensions of social capital, Szulanski (1996), investigating knowledge exchange in large organisations, finds out that it can be affected by the inner complexity of knowledge as well. Finally, the link between the individual-level cognitive processing and the community-level cognitive processing has not been investigated in analytic terms.

Theoretical model. Main tenets

The aim of the empirical analysis is the investigation of the interplay existing in a hybrid community between social capital (meant, as mentioned above, as the whole of social assets which are embedded within social networks), motivational factors, the quality of knowledge exchange, and the growth of individual knowledge, among community members.

Quantitative studies on hybrid communities and knowledge dynamics are basically absent in literature; however, a few relevant studies which analyze such dynamics in the context of virtual and organisational communities do exist. The adopted framework partly relies on the model developed by Chiu et al. (2006) in investigating knowledge transfer in virtual communities, taking into account the contribution of both social capital and personal motivation to the intensity and quality of knowledge transfer. The hypotheses of Nahapiet and Ghoshal (1998) and the findings of Tsai and Ghoshal (1998) on the correlations among different social capital dimensions and their effects on inter-unit knowledge sharing in large organisations are also a basis for the model. Two features, however, make the present approach different: a) the hybrid nature of the investigated community; b) the attempt at discriminating between different forms of knowledge.

As for the former, the study of a mixed physical-virtual community provides with the possibility to investigate the effects of both face-to-face and virtual structural capital on social assets and cognitive dynamics, and compare them.

As for the latter, a knowledge taxonomy is adopted, based on two popular dichotomies:

a) Russell (1998)'s distinction between experiential and declarative knowledge, that is, knowledge derived by experience, of a procedural nature (*knowledge by acquaintance*); and knowledge derived from notions and data sources, of a declarative nature (*knowledge by description*); for a influential discussion within cognitive sciences cp. Winograd (1975; 1976).

b) Nonaka (1994)'s distinction between information (organized data) and knowledge in the strict sense (information-sustained belief). The identification of different forms of knowledge and the presence of a factor measuring the quality of knowledge exchange allows to investigate barriers to access which are related to the nature of knowledge itself, and which Szulanski (1996) empirically finds to be relevant.

Empirical analysis

An empirical analysis based on structural equation modeling is carried out among the members of the National Library of Latvia community in order to test the above-mentioned hypotheses. Findings show both some common and consistent results with several prominent organizational and community studies (above all, the positive effect of social capital on the quality of knowledge

exchange and individual knowledge growth), and some discrepancies (the role of motivational factors in enhancing complex knowledge growth) as well.

Data collection

The model that is described in the following paragraphs was tested on the basis of a survey carried out among the members of the National Library of Latvia (the largest library institution in the Baltic States) users' community. Such a community includes several thousands of habitual members and over 70.000 occasional users, based in Latvia and abroad, interacting both in real life and through virtual online platforms (portals, forums, social networks) in order to exchange information, materials, documents related, in particular, to the cultural and historical heritage of Latvia. Its features (an intentional community characterized by hybrid infrastructure and by an intense exchange and sharing of information and knowledge among members) make it a very suitable case study for the scope of the paper.

Data were collected on the basis of answers to questions / statements measured on 5-point Likert psychometric scales (Likert, 1932). The questionnaire was structured according to sections associated with the theoretical model variables which are outlined in the following paragraphs (social capital dimensions; motivational attitudes; knowledge exchange quality; knowledge dimensions) with a subset of questions / statements associated with each hypothesized variable.

Variables

The choice of social capital dimensions is based on Nahapiet and Ghoshal's work (1998), which has set the standard for a useful taxonomy in order to investigate the cognitive benefits of social capital:

Structural social capital, meant as networks, linkages, that is, the social networking structure of a community;

Relational social capital, meant as positive attitudes among members of a community (e.g. trust towards community members). Putnam (1993) defines it as consisting of trust and shared norms. Nahapiet and Ghoshal (1998) attribute to it a crucial motivating role for knowledge exchange dynamics.

Cognitive social capital, meant as common narratives, language, vision among members of a community (Nahapiet and Ghoshal, 1998). With regard to knowledge exchange dynamics, it is associated with combination capability and relative absorptive capacity (Lane and Lubatkin, 1998).

Such a taxonomy is extremely influential in studies investigating knowledge sharing and enrichment in organisations and communities. However, many social capital theorists, in particular those who have studied social capital assets as resources owned by individuals or groups rather than collective ones (e.g. Bourdieu, 1986), and those who have adopted a *network*-based approach (Portes, 1998; Burt, 2001), define social capital as the set of assets (that is, the relational and cognitive dimensions) which are embedded within networks, excluding networks themselves from such a definition. In the context of the present paper, which adopts an analysis approach at the *micro* (individual) level, structural capital is not included in the theoretical model; it is hypothesized that it consists of a mix of face-to-face and virtual networking, and the attention is focused on embedded social assets and the way in which they interact with motivational factors and knowledge sharing in such a context, characterized by a hybrid social network infrastructure.

Besides, on the basis of preliminary factor analysis, we identify two sub-dimensions of cognitive capital:

- a) a component related to the existence of a common language;
- b) a component related to a common professional background.

Personal motivation, as in Chiu et al. (2006), is divided into two sub-dimensions:

- a) motivation oriented towards personal benefits, as a measure of 'egoistic' behaviour;
- b) motivation oriented towards community benefits, implying sense of belonging to the community.

Three dimensions of knowledge are taken into account, by combining the Russell and Nonaka dichotomies which are quoted above:

Declarative knowledge, or know-what. This is knowledge about facts, consisting of organised data (information) and knowledge about sources of information. It is a simple form of knowledge, supposedly not characterized by relevant inner barriers; the main barriers to its access are rather related to the context and to the involved actors.

Procedural knowledge, or know-how. This is knowledge about procedures, practical skills. It is characterized by relevant inner barriers, since it is usually tacit. Organisational learning studies investigate the ways through which it can be made explicit. It can be linked to Polanyi (1967) and Nonaka and Takeuchi (1995)'s tacit knowledge, and to Schon (1988)'s knowledge-in-action.

Conceptual knowledge, or know-why. This is knowledge about laws and principles. It is usually expressed in coded forms and languages, not understandable for everyone; besides, it requires the ability of connecting causes and effects. Hence, it is characterized by relevant inner barriers.

Hypotheses

Social capital dimensions and personal motivation are supposed to enhance the intensity and quality of knowledge exchange, which, in their turn, have a positive effect on the growth of individual knowledge dimensions. As mentioned above, most hypotheses are based on the findings of Tsai and Ghoshal (1998) in the context of inter-unit knowledge exchange in large organisations, and on Chiu et al. (2006) study of knowledge transfer in virtual communities. The hypotheses are listed following.

Relations between social capital dimensions

Hypothesis 1. Communication (a) and profession-related (b) cognitive social capital positively affect relational capital. Tsai and Ghoshal (1998) find support for such an hypothesis, which implies a positive effect of shared vision on perceived trustworthiness.

Effects of social capital on personal motivation

Hypothesis 2. Relational capital positively affects altruistic personal motivation. It is supposed that a trustful climate enables community-oriented behaviour.

Hypothesis 3. Language-related (a) and profession-related (b) cognitive social capital positively affect community-oriented personal motivation. It is supposed that a common language and terminology, and the perception of common interests may lead to strongest community linkages and sense of belonging.

Hypothesis 4. Language-related (a) and profession-related (b) cognitive social capital positively affect egoistic personal motivation. It is supposed that a common language and terminology, and the perception of common interests, may lead to a behaviour aiming at collecting useful information and knowledge for personal benefits.

Effects of social capital and personal motivation on knowledge quality

Hypothesis 5. Relational social capital positively affects knowledge quality. Trust is found to be an antecedent of knowledge exchange both in organisations (Tsai and Ghoshal, 1998) and virtual communities (Ridings et al., 2002). Chiu et al. (2006) find empirical evidence that various dimensions of relational capital affect not only intensity, but also quality of knowledge exchange in virtual communities.

Hypothesis 6. Both community benefits (a) and personal benefits (b) oriented personal motivation affect knowledge quality. Various studies (e.g. Butler et al., 2002; Zhang and Hiltz, 2003) suggest that personal expectations (both egoistic and altruistic) play a relevant role in the will of people to share knowledge within communities and organisations. Chiu et al. (2006) find partial empirical support for such hypotheses.

Effect of social capital and personal motivation on individual knowledge growth

Hypothesis 7. Cognitive (profession-based) social capital positively affects (a) procedural and (b) conceptual knowledge. It can be supposed that interacting with people who have the same background may lead to an increase in procedural and conceptual skills.

Hypothesis 8. Both community benefits (a) and personal benefits (b) oriented personal motivation affect declarative knowledge.

Effects of knowledge exchange quality on individual knowledge growth

Hypothesis 9. Knowledge exchange quality affects the growth of a) declarative b) procedural c) conceptual knowledge. Szulanski (1996) finds evidence of causal ambiguity being the main barrier to access to knowledge in organisations. Therefore, it seems reasonable to hypothesize that personal knowledge growth is affected by the quality (in terms of reliability, accurateness, completeness) of sharing.

Relations between knowledge dimensions

Hypothesis 10. Declarative knowledge affects (a) procedural and (b) conceptual knowledge. It is supposed that – at least to some extent – the individual's information base affects his beliefs and practical skills.

Hypothesis 11. Conceptual and procedural knowledge are positively correlated.

Besides, a default hypothesis for structural equation modeling (that is, correlation between exogenous variables – in this case, the two sub-dimensions of cognitive capital) is included in the model.

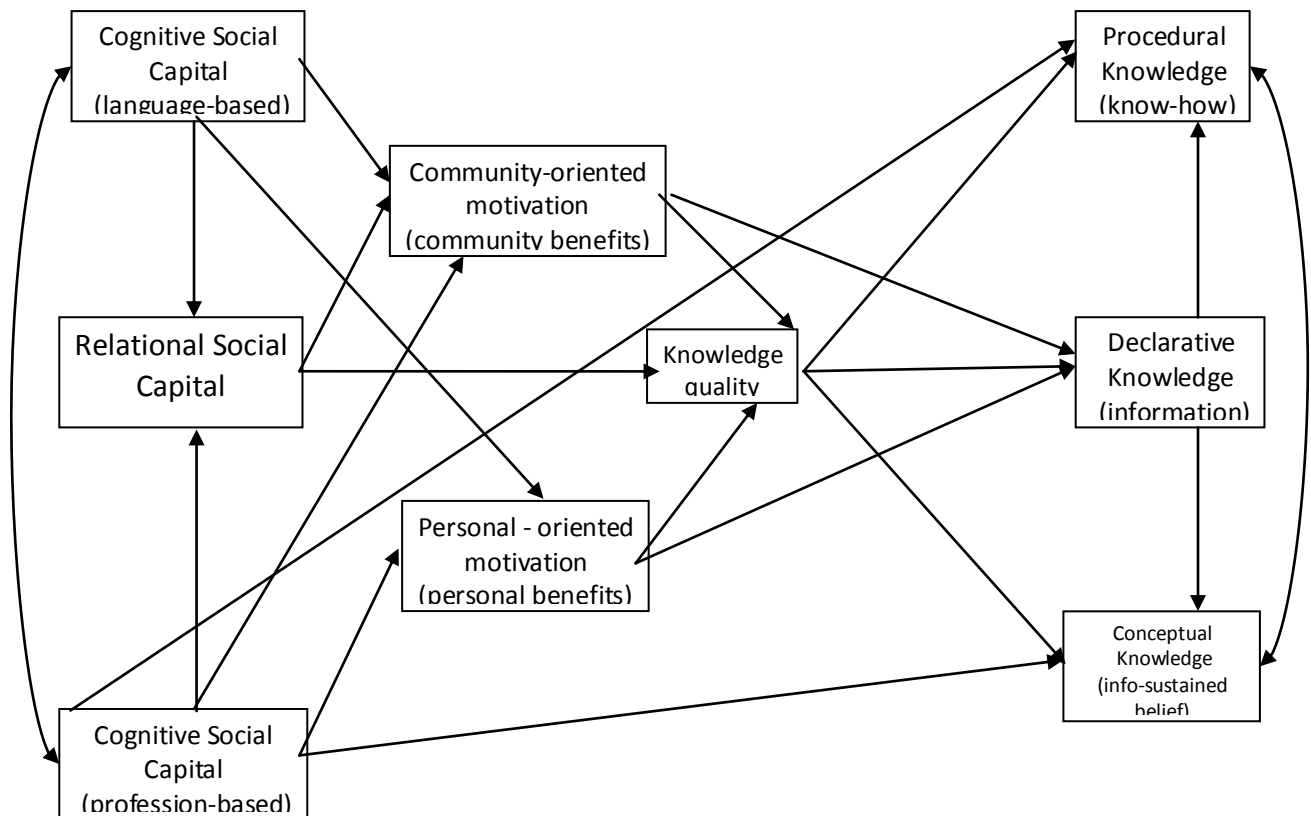


Figure 1. Theoretical model

Empirical analysis: methodology and data

The hypothesized model is a *recursive* one – that is, it follows the patterns of *path analysis* (Bollen, 1989): effects are structured according to a causal chain from left to right, lacking loop effects.

As mentioned above, the model was tested on the basis of a data survey among the large users' community of the National Library of Latvia. The structural analysis which is described in this paper is based on 261 observations. The amount of observations is sufficient to be considered reliable in statistical terms.

Because of the complex nature of hypothesized cause-effect patterns, and the ambivalent (both dependent and independent) role of intermediate variables, the chosen approach for the model analysis was structural equation modelling (Joreskog and Sorbom, 1979). The particular nature of variables, most of which are measured on psychometric scales, and therefore are non-metric (Stevens, 1952), has led to the choice of an ad-hoc estimation method - Bayesian estimation, which is the standard technique for the analysis of ordinal variables-based models in the chosen software (Amos 19.0, integrated in SPSS 20.0).

Results

Analysis Of Research Results

Results support the significance of most hypotheses, with two exceptions. *Hypothesis 4a* and *4b* are found to be non-significant; hence, cognitive capital based on professional proximity is not found to be a relevant factor for motivation building.

Besides, some unexpected significant direct effects are found:

Relational social capital positively affects declarative knowledge. Such a finding seems to suggest that the impact of trust on information sharing does not only depend on the way trust affects sharing quality and community sense of belonging, but also has a direct component. However, such a direct effect is found to be relatively weak.

Relational social capital positively affects egoistic personal motivation. This effect seems to suggest that trust can also foster community activity aimed at personal cognitive gain.

Community-oriented motivation positively affects procedural and conceptual knowledge. Such findings imply that community-related motivational factors affect the individual growth of complex forms of knowledge. This partially contradicts the work of Szulanski (1996). Such a finding is quite surprising since, at first sight, the access to procedural and conceptual knowledge would seem to be mainly obstructed by inner rather than motivational barriers. This also supports the impact of shared motivation as a guiding force behind the collective epistemic agency in this case supporting the generation of both procedural and conceptual knowledge. Motivation that supports belonging to a community generates life forms, practices and patterns of communication that characterizes a concrete life space in sense of Lewin (1936, 1951).

The adaptation of the model (including the above mentioned unexpected significant effects) to data is good ($P=.510$). Besides, it is worth to notice that squared multiple correlations are relatively high, implying that the explicative power of the model with regard to endogenous variables is acceptable.

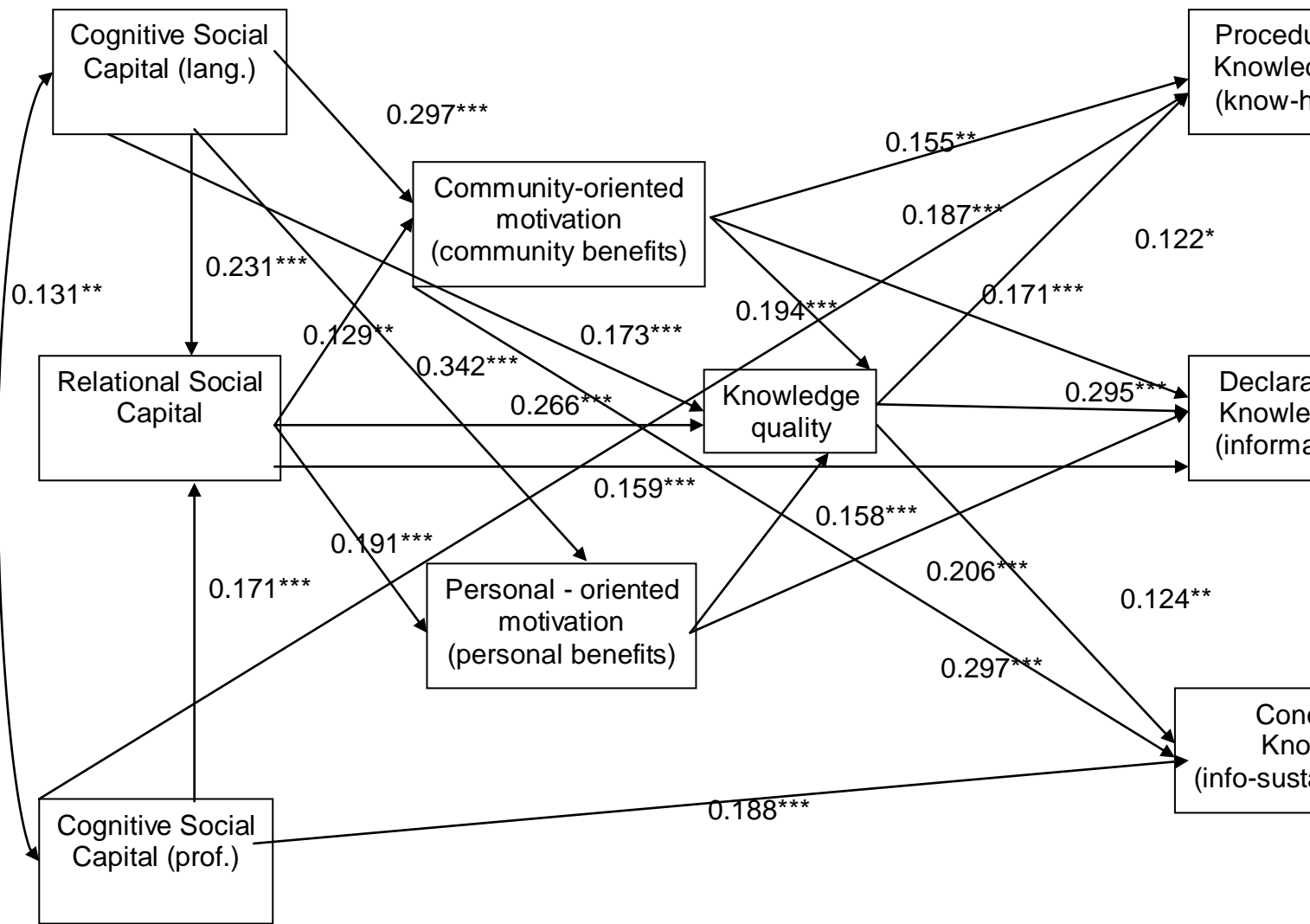


Figure 2. Results (standardized direct effects)¹

Sensitivity analysis

Results have been tested with regard to two control dimensions: a) the individual's preference for either face-to-face or virtual networking; b) the respondents' age.

Social infrastructure preference. Results have been tested for two different groups of respondents, by discriminating between community users adopting different forms of social infrastructure (mainly face-to-face / mainly virtual). Such an analysis has evidenced a quite strong sensitivity to the infrastructural factor.

¹ Solid lines: significant effects
 Dash-dot lines: unexpected significant effects
 ***: significant at 99% confidence level (error probability < 0.01)
 **: significant at 95% confidence level (error probability < 0.05)
 *: significant at 90% confidence level (error probability < 0.1)

Mainly face-to-face users

Several differences are found with regard to the general sample analysis. In particular, the following hypotheses are found to be non-significant:

Hypothesis 1b

Hypotheses 4a and 4b

Hypotheses 9b and 9c

Besides, the two cognitive social capital dimensions are not found to be correlated.

Community-oriented motivation is found to affect conceptual but not procedural knowledge.

Relational capital does not directly affect declarative knowledge.

Such results have two striking implications: a) profession-based cognitive social capital has a relevant effect on individual knowledge growth but it is not a relevant factor in fostering motivation and trust. b) community-oriented motivation is a more relevant direct factor for individual knowledge growth than the quality of knowledge exchange.

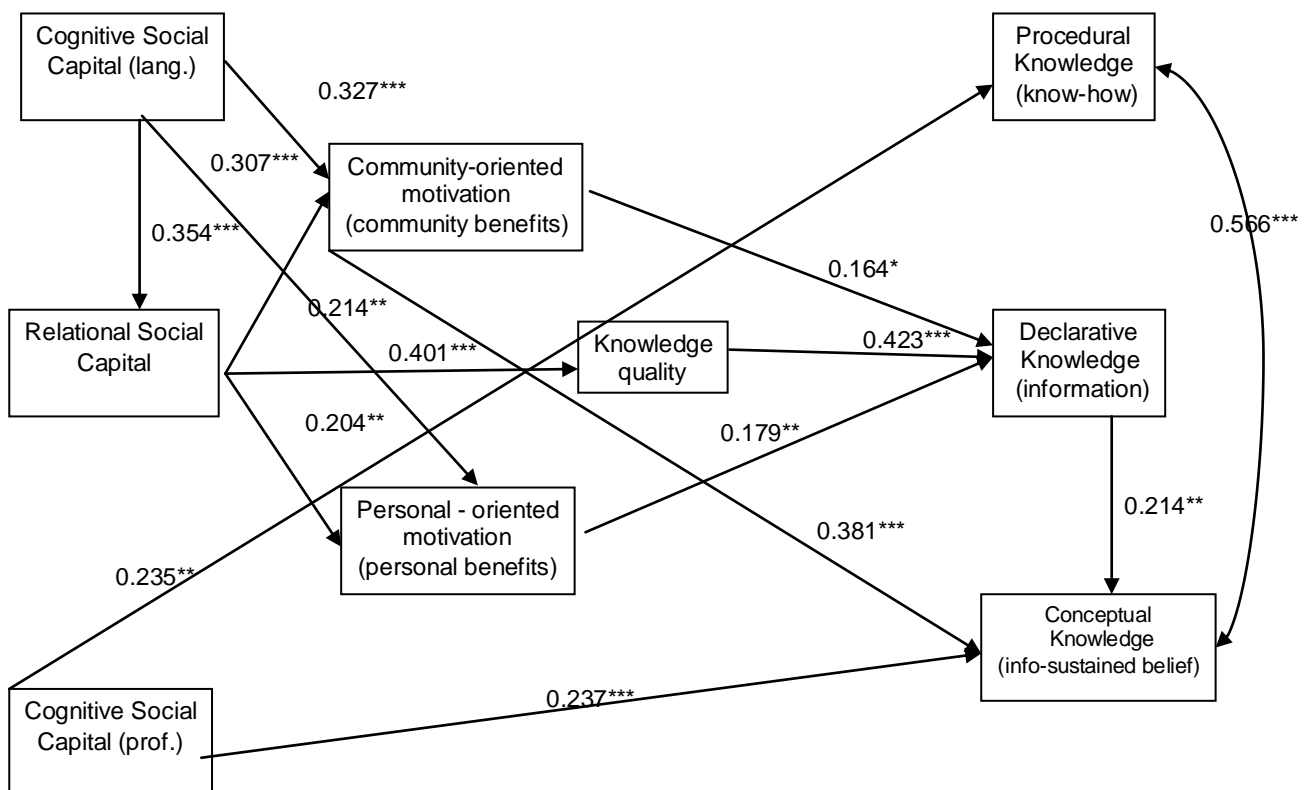


Figure 3: Results. Mainly face-to-face users

Mainly virtual users

In this case non-significant hypotheses are:

Hypothesis 1a

Hypothesis 3b

Hypothesis 4a and 4b

Hypothesis 7a and 7b

Hypothesis 9b

Community-oriented motivation affects all three knowledge dimensions. Relational capital does not directly affect declarative knowledge.

Results show different roles of the two components of cognitive capital, the language-based one affecting knowledge exchange through community motivation, and the profession-based one affecting it through trust and egoistic motivation. Also in this case, community motivation is a relevant factor for individual knowledge growth.

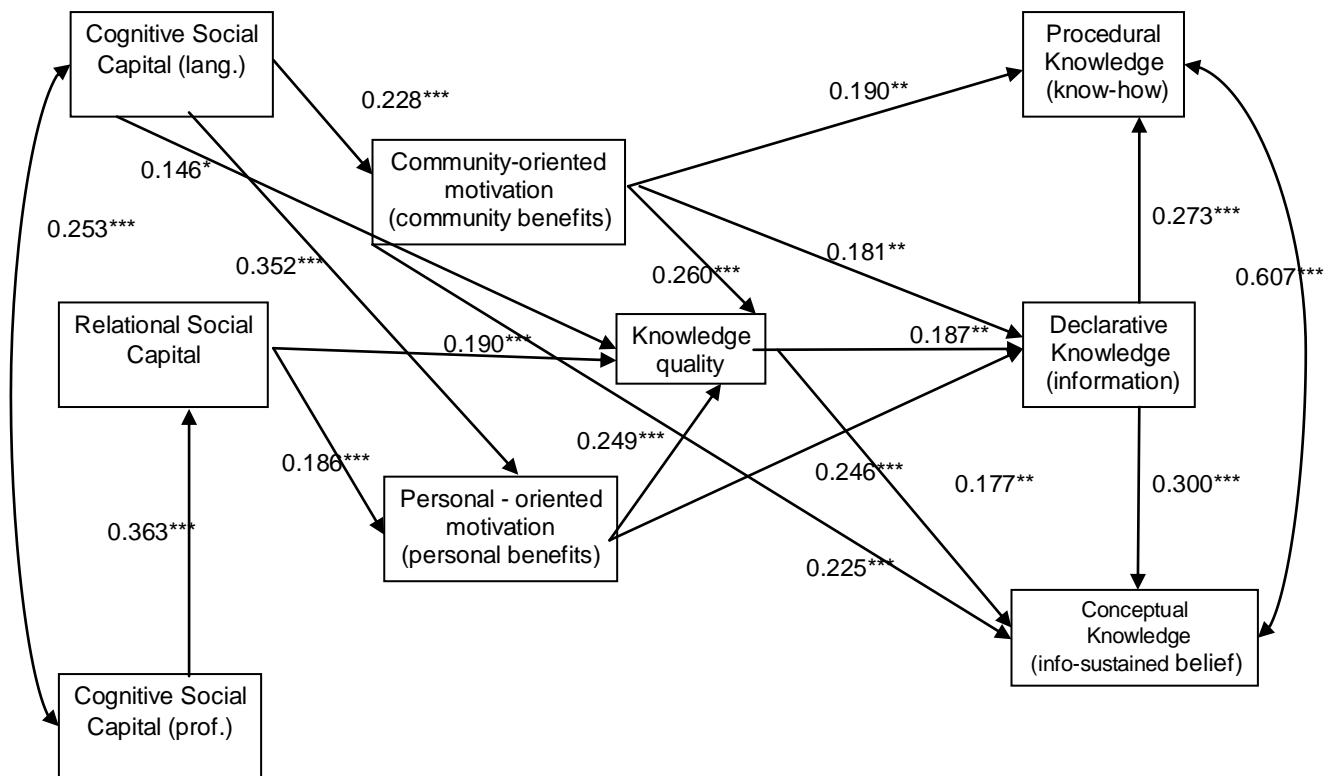


Figure 4: Results. Mainly virtual users

Age. Respondents have been clustered according to age (above and below 40). The role of community-oriented motivation as a predictor of knowledge transfer and growth is somehow more pronounced among younger respondents. Relational capital seems to foster personal-oriented motivation among elder respondents and community-oriented motivation among younger ones.

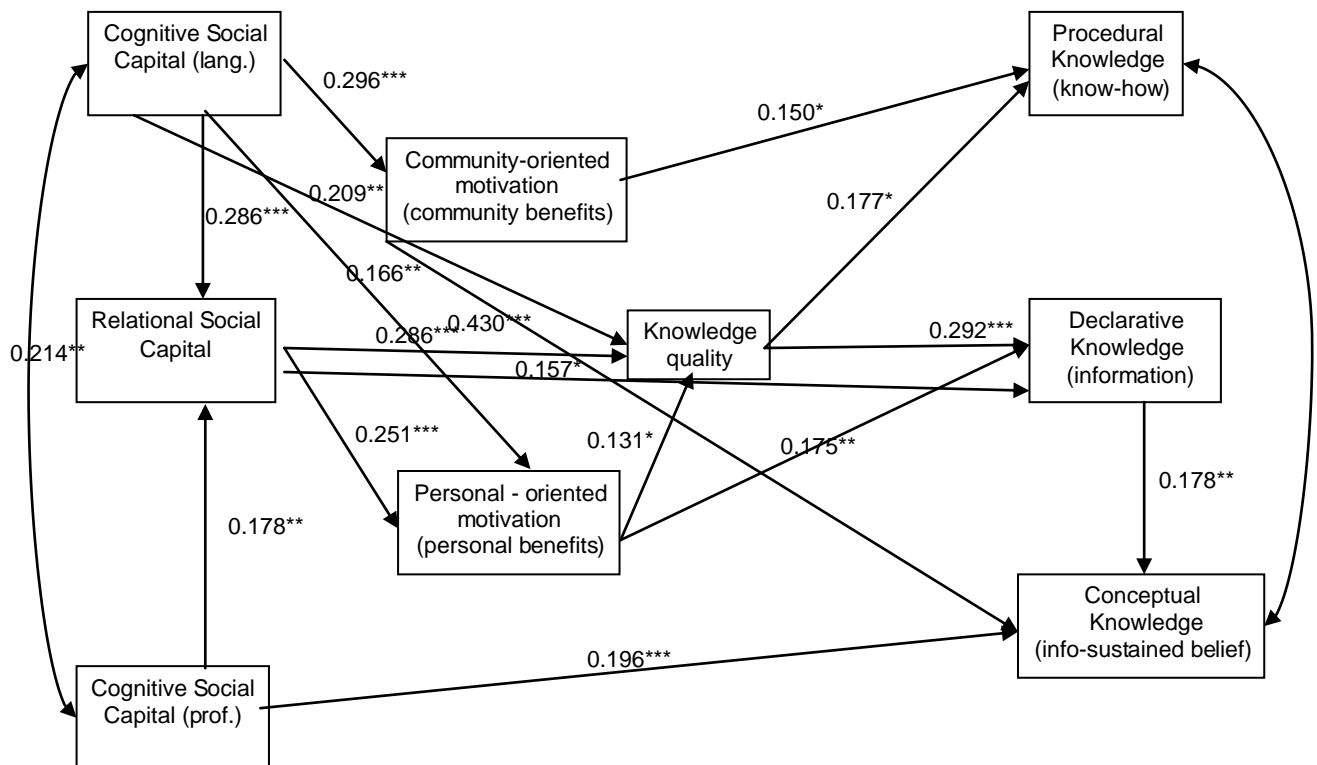


Figure 5. Respondents aged over 40

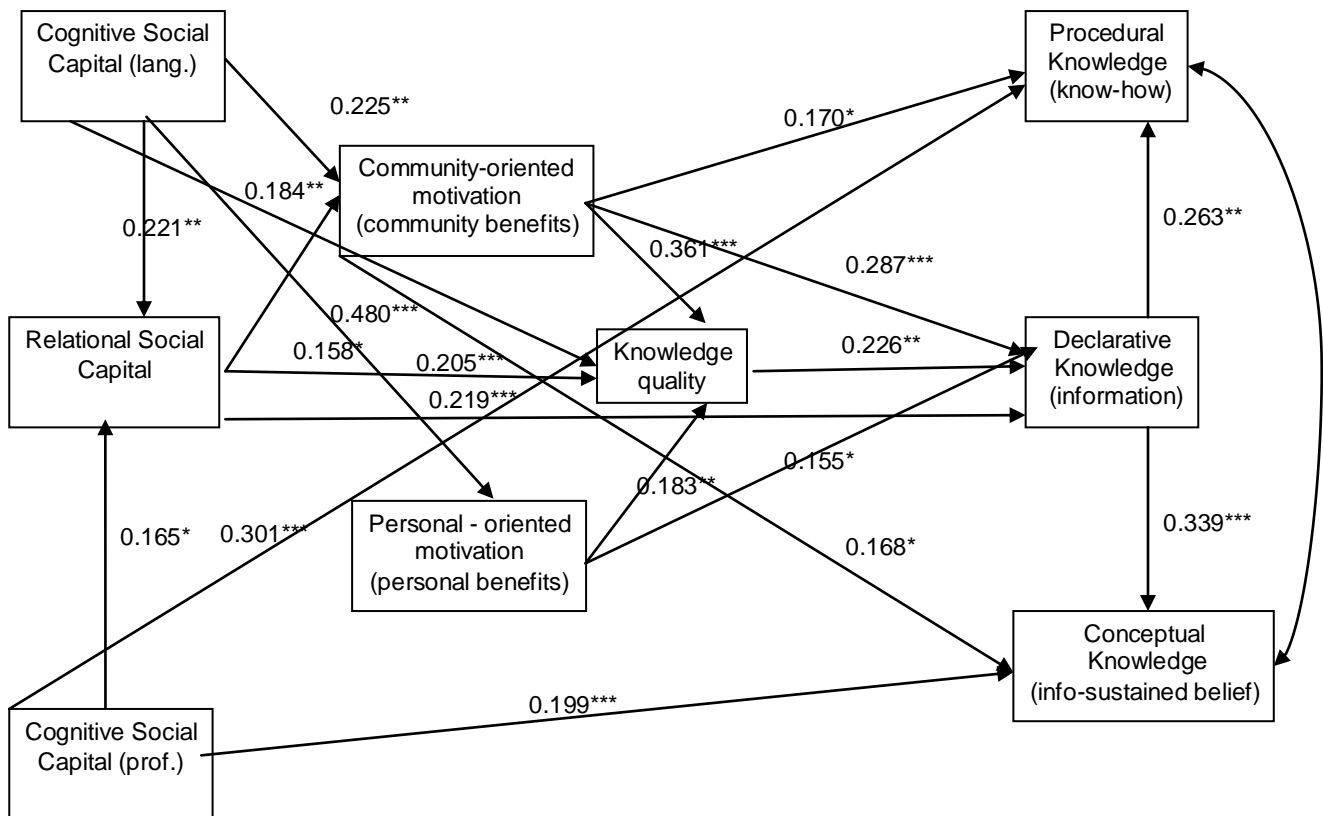


Figure 6. Respondents aged under 40

Personal income. Results have been tested according to respondents' personal income, adopting 400 Ls (roughly speaking, the average net income in Latvia) as the threshold figure. Once again, the most striking difference in results is related to the role of motivational factors. In particular, community-oriented motivation is a very relevant predictor of knowledge transfer and growth among wealthier respondents, whereas it is absolutely negligible among poorer ones. In both cases, relational capital is not found to be a significant predictor of community-oriented motivation.

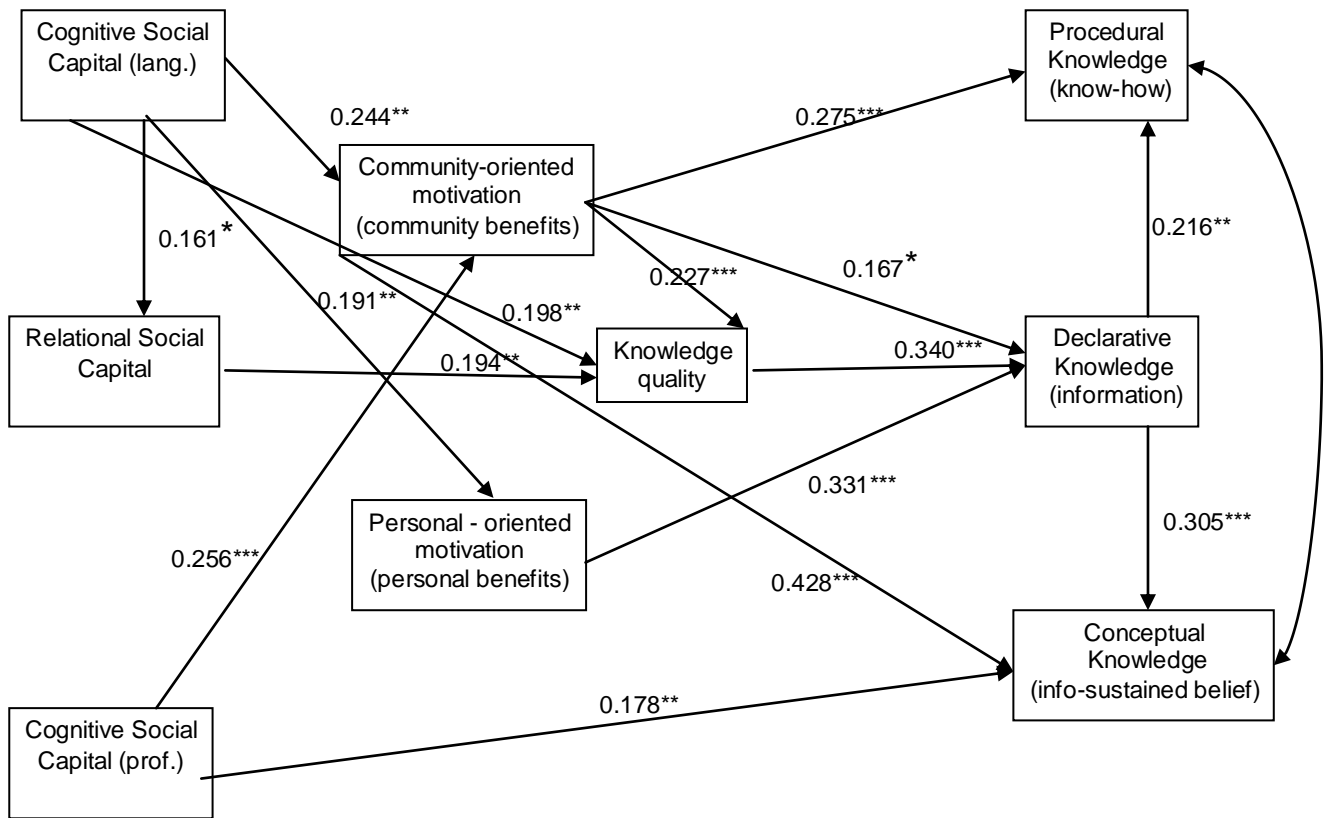


Figure 7. Respondents' income above 400 Ls

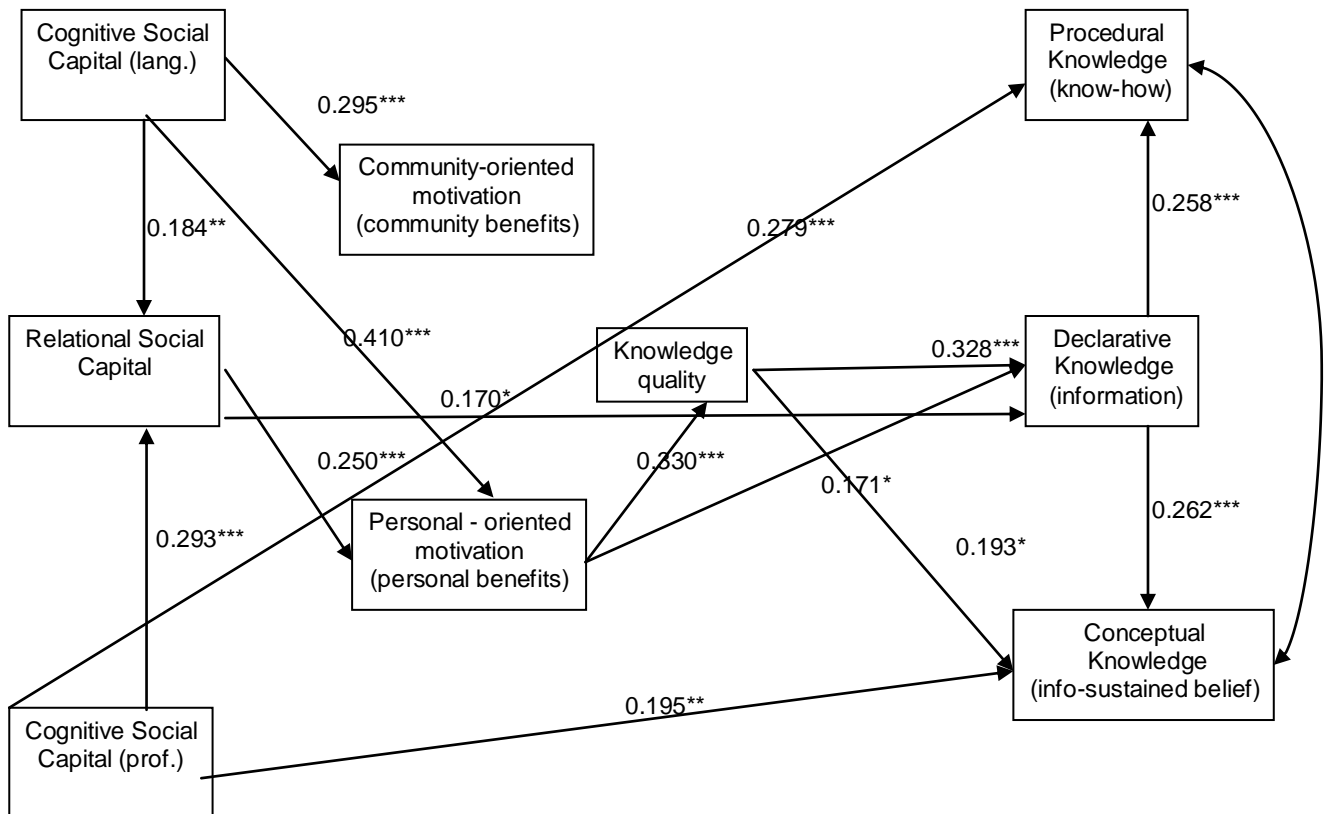


Figure 8. Respondents' income below 400 Ls

Discussion of results

Results seem to support some common findings in organisational and community literature on learning and knowledge transfer. However, some unexpected effects are found, which may depend on the specific nature of hybrid communities. The main and most significant results can be summarized following:

- Social capital dimensions positively affect (either directly or indirectly) knowledge quality exchange, and individual knowledge growth. This confirms the findings of several social capital-based studies in organisational literature (Tsai and Ghoshal, 1998; Chiu et al., 2006)
- This said, different social capital dimensions play different roles with regard to the investigated dynamics – and, to some extent, depending on the more or less physical nature of networking. In particular, relational (trust) capital is a relevant factor behind information access and knowledge sharing, especially in an indirect way (by fostering motivation and the quality of knowledge exchange). The role of cognitive capital sub-dimensions is strongly different between face-to-face and virtual users. Among face-to-face users, the language-based dimension has an indirect effect on knowledge dynamics through the empowerment of trust and motivational factors, whereas the profession-based dimension has a direct impact on complex knowledge growth which is not related to social capital building. Among virtual users, the language-based dimension fosters motivational dimension, whereas the profession-based one has an enhancing effect on trust.
- Unexpectedly, as mentioned above, community-oriented motivation is, generally speaking, found to be a predictor of individual knowledge growth even with regard to complex forms of knowledge. Therefore, motivational factors (in particular when expressing a collective benefits-oriented attitude) seem to play a more relevant role than the quality of knowledge exchange in enhancing access to knowledge. Such findings seem to contradict partially the studies of Szulanski (1996) who identified inner barriers to knowledge as more relevant than motivational ones. This finding, however, supports the conception of collaborative and collective epistemic agency of social communities (Gilbert, 2004, Tomasello, 2009).
- The most striking difference along age and income lines consists in the role of motivational factors as predictors of knowledge transfer and growth. The fact that the ‘altruistic’ motivational dimension matters more among socio-economically more advantaged respondents (wealthier and younger) seems to be somehow in line with the hypotheses (and findings) of some regional development studies associating quality of life with higher levels of social capital (Krishna and Uphoff, 1999; Sechi et al., 2013).
- Discrepancy between the results of sensitivity analysis relative to age might indicate the impact of format and channel of communication used during the process of socialization and prolonged process of social interaction. Although this lies outside of the scope of the current research, perhaps it makes sense to think of analog vs digital format of perception used in communication. The former case communication can be dominant among elder respondents; the latter case among younger ones.
- In general, social patterns of knowledge access and growth look very rich in their variety. This may support Wellman’s (2001) and Hampton and Wellman’s (2003) claims about the positive complementary role played by ICTs and face-to-face contacts in fostering socio-cognitive dynamics in communities (e.g. ICTs may foster weak ties that span structural holes; see Burt, 2000). An interesting question than cannot be answered in using the present methodology – are virtual links psychologically less significant than the face-to-face ones? Perhaps the answer is more complex and depends on the communicative situation – there might be psychologically more real virtual and there might be also psychologically more real face-to-face links. We could hypothesize that the determining factor is not the format-specificity or channel specificity but the meaning assigned to the message and to the actors involved in the communicative interaction.

As said above, the empirical analysis must be strictly interpreted as a pilot one. Further analysis will test the sensitivity of results to control variables of a socio-demographic and socio-economic nature, which may help identifying intra-community divides accounting for differences in socio-cognitive dynamics (see Lamont, 1992).

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