

Development and Application of an Inter-Organizational PPP Knowledge Transfer Effectiveness Model for Knowledge Sourced in Public Sector Organizations

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Abstract

The research aim is to develop and apply the conceptual inter-organizational knowledge transfer effectiveness (IOKTE) model to the inter-organizational transfer of Public-Private Partnership (PPP) related knowledge between public sector organizations in Flanders. The model assumes a relationship between an individual's ability to make PPP-related decisions and the extent to which knowledge is sought after, applied and shared in an inter-organizational manner within the public sector. The inter-organizational transfer of knowledge studied in this article is specific to PPP in Flanders and studied for public sector actors active at diverse policy levels. The aim is to uncover the extent to which the current system of inter-organizational knowledge transfer fits the user's satisfaction, expressed as the extent to which the use of the system improves the perceived decision-making on PPPs. The results indicate that searching for, sharing and using PPP-related knowledge sourced in public sector organizations improve the perceived decision-making ability. The research establishes that the current public sector PPP knowledge transfer system is perceived as being effective, yet for the assessment of its efficiency, insufficient data is found. Issues that stand to be improved are the fragmentation of the knowledge assets and the access across policy levels.

Keywords

Knowledge Transfer, Public-Private Partnerships, Public Sector, Knowledge Management, Project Management, Public Procurement, Information Asymmetries

1. Introduction

Several authors have expressed the importance of knowledge transfer and management for modern day public organizations [1] [2] [3] [4] [5].

Others have stated that knowledge is a critical resource and determinant of Public-Private Partnership (PPP) success [6]. This has implications for public organizations involved in PPP projects, as this increases the necessity to resourcefully combine new, innovative and existing insights to develop dynamic competencies in support of organizational goals, e.g. the successful initiation, implementation and monitoring of PPP projects [7] [8].

Such a requirement for the development of knowledge assets is reinforced by the fact that public sector organizations (PSO) are confronted with demands to become more efficient and effective, *i.e.* increasing financial cutbacks, a rising demand for services and quality and a push towards performance-related management [8]. Since PSO often have to achieve conflicting goals imposed upon them by numerous stakeholders simultaneously, this imposes challenges on the sustainable development of knowledge assets, which are often seen as second-rate resources. PSO furthermore partake in complex global and local networks of political, societal and economic interdependencies, enabled in part by the expanding capabilities of information and communication technologies [9]. As a result, this creates the ability to share and search for knowledge and information pertaining to a particular topic across projects, organizations and national boundaries [9]. However, ample access to information and expertise can create situations where knowledge is ubiquitous and thereby leads to a situation of overload rather than parsimony [10]. It is therefore essential that public sector organizations manage their knowledge, given that their knowledge base [11] may serve as a beacon in the vast sea of (PPP-related) knowledge and information.

As a crucial element of PPP projects' success, public sector knowledge management has yet to gain the interest of mainstream strategic management literature [1]. Especially in relation to the process of public sector organizations' PPP knowledge management and the extent to which the inter-organizational PPP-related knowledge transfer processes influence the perceived knowledge management's effectiveness, extensive academic work has been scarce. The study of this managerial phenomenon is however important, even if transferring knowledge and storing knowledge are not a new nor original undertaking.

From a PPP perspective, the characteristics of PPP-projects, when defined as long-term infrastructure investment projects [12], underwrite that PPP-related matters are usually drawn-out in time due to the complexity of procuring and delivering PPP projects [7]. Hence, this prolonged situation creates the possibility that knowledge might be lost, fragmented or misplaced [13]. Long-term projects also surpass changes that take place within organizations. This may affect the continuity of project monitoring and evaluation through employee turnovers, replacements, retirement and other sources of staff transitions [14]. Complexity in PPP projects furthermore also originates from the large number of stakeholders that are involved in such projects. Solely for the public sector,

PPP projects often involve several of these actors, especially in those projects developed on Flemish territory [12] [15] [16]. PPP projects additionally consist out of several sequential stages, each with specificities and objectives [17]. Adding to this complexity is the implications of faulty project implementation, due to a lack of skill and/or expertise. This, whilst public sector organizations face highly transient and ever-evolving surroundings [7], in turn evoking the need for the development of coping-mechanisms and instilling resilience and adaptivity into the core of the organization [18], fostering dynamic project engineering and management skills.

Transferring PPP related knowledge between stakeholders, and therefore, between public stakeholders is challenging due to this complexity, yet according to Carillo *et al.* (2006) stand to nurture innovation and increase the public sector's ability to foster successful PPP projects [17]. This is since PPP-related knowledge sharing stands to remain relevant over long periods of time, may aid in overcoming divergent public sector goals and therefore stands to increase the public sector's capacity to successfully initiate, develop, implement and monitor PPP projects [17] [19].

Current evolutions in IT have also lowered boundaries imposed upon inter-organizational knowledge transfer (KT), even in the public sector. Caution is however warranted, since even when inter-organizational transfers are supported by IT systems, this does not necessarily guarantee a free circulation of knowledge through organizations or between organizations [20]. Hence, the availability of technological innovations alone does not necessarily improve knowledge transfer be it organizational or inter-organizational. For the latest IT technologies to improve KT, it is important that it is adapted to the management of organizational knowledge in relation to the specific needs expressed by participants in the field.

Therefore, from a knowledge management perspective, this paper aims to study the perceived effectiveness of inter-organizational PPP knowledge transfers that occur in the public sector in Flanders. The research hereto explains the research design, consisting of an inter-organizational knowledge transfer effectiveness (IOKTE) model and its application to the PPP knowledge transfer in Flanders between public sector organizations. Next to this research method, *i.e.* a quantitative survey-based analysis of perceived knowledge transfer effectiveness (based on descriptive statistics and a partial least squares structural equation model) the results of the study are discussed and the implications of the analysis are presented. The paper concludes with a recapitulation of the main findings and their academic implications. Finally, it also offers suggestions for future research.

2. Inter-Organizational Knowledge Transfer Effectiveness (IOKTE): Conceptual Model and Operationalization

To apply the inter-organizational knowledge transfer effectiveness (KTE) model usable for assessing the perceived fitness of public sector inter-organizational

knowledge transfer, several variables are to be measured to test relevant hypotheses. An overview of the literature that was consulted can be found in annex 4. The constructs used in support of the KTE model are based on a variety of resources, ranging from the IS success model proposed by DeLone and McLean (1992), to models developed recently by Wu and Wang (2006), Kulkarni, Ravindran and Freeze (2007), Pérez-Nordtvedt *et al.* (2008) and critical factors proposed by authors like Alzami and Zairi (2003), Duan, Nie and Coakes (2010), Khamesh and Jolly (2006), and Jennex, Smolnik and Croasdell (2007) [21]-[28]. The operationalization of the variables and their relation to the hypotheses is brought forwards in the following paragraphs. The operationalization of influential factors at the inter-organizational level is similar to the one found at the individual or organisation level. The latter is the result of the fact that knowledge transfer at any level is based on person-to-person endeavours, possibly mediated by communication technology. As a consequence, the transfer process can be studied at these different levels, based on insights that apply from the lowest to highest organizational levels [29]. **Figure 1** provides an overview of the model.

2.1. Endogenous Variables: Knowledge Transfer Effectiveness, Inter-Organizational Knowledge Searching, Sharing and transferred Knowledge Application

In the knowledge transfer model proposed in this paper, inter-organizational transfer effectiveness is expressed as the perceived increased ability to make decisions pertaining to public-private partnership involvement. Crucial in this assessment of effectiveness is the application of knowledge towards a particular end [20] [30]. Performing inter-organizational knowledge transfers (IOKT), *i.e.* sharing and searching for knowledge in an inter-organizational fashion, signals the use of a process. Whilst the application of shared or found knowledge is essential for this knowledge to be able to influence decision-making and problem solving, which signals the effectiveness of the inter-organizational knowledge

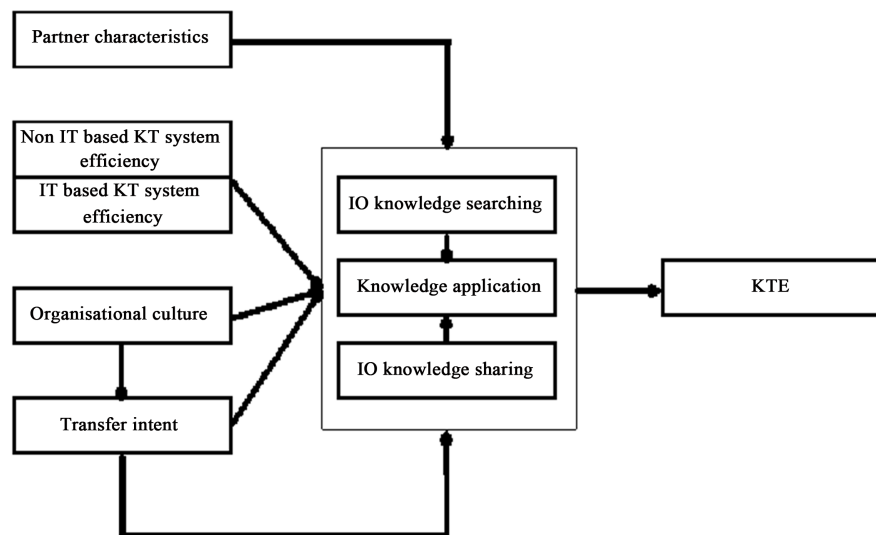


Figure 1. Inter-organizational knowledge transfer effectiveness model.

transfer in terms of transfer outcome [31] [32]. This in turn determines the added value (expressed as perceived improved decision-making ability) that arises from performing a knowledge transfer [9] [21] [22] [23] [24] [26] [33] [34]. System use is expressed as searching for, the sharing of and the application of knowledge sourced in an inter-organizational manner in and between public sector organizations.

Towards the application of the IOKTE model under the conditions specified for the transfer of PPP knowledge in Flanders, an operationalization of the endogenous variables was established in several parts. First respondents were asked whether they search for PPP-related knowledge at other public sector organizations active on the same territory. Afterwards the same approach was used to assess whether respondents shared PPP-related knowledge in an inter-organizational manner in the public sector. Respondents were also asked if they used the knowledge that they shared and searched for. Finally, questions that gauge if respondents felt that they could follow-up on current developments and innovations in PPP due to IOKT and whether they felt that their PPP-related skills and decision making improved because of the inter-organizational knowledge transfer were included to assess the perceived effectiveness of the knowledge transfer.

As the perception of the effectiveness of inter-organizationally sourced knowledge can only follow the knowledge that has been sourced and applied, this means that the model assumes that searching, sharing and effectively applying inter-organizationally transferred knowledge will affect the perceived benefit towards decision-making in PPP. A relation between the use of the transfer system (*i.e.* searching, sharing and applying knowledge) and the perception of its effectiveness is assumed to be positive. Hence the more the IOKT system is used; the more this will lead to improved decision-making ability, indicating the fitness of the knowledge transfer system.

H1: The inter-organizational transfer of PPP related knowledge positively impacts the perception of decision-making ability concerning PPP projects that take place on Flemish territory.

H2: Searching for and the sharing of PPP knowledge in an inter-organizational manner in the public sector in Flanders will positively impact the application of PPP knowledge.

2.2. Exogenous Variables and Hypotheses

2.2.1. Organizational Culture

A knowledge oriented organizational culture is one of the most influential factors of successful inter-organizational knowledge transfer [18] [23] [31] [35] [36] [37]. A culture that promotes change and innovative behaviour encourages the active exchange of ideas and increased knowledge transfers [5] [31]. Organizational culture also signals the values and views that are instilled in an organization and its workforce, which in turn influences attitudes and behaviour. Many of these elements are implicitly present in an organization. Elements such as the support that is offered by the higher management in the organization that an individual is part of, the incentives that are offered in terms of career advancement

and income, as well as the orientation of the overall culture within the organization, in its focus on organizational learning and knowledge management, all signal an organizational culture that promotes knowledge transfer [23].

Organizational culture and the extent to which this culture is directed towards the inter-organizational transfer of knowledge was operationalized as the extent to which the respondents' organization facilitates KT through higher management, through the provision of resources towards the transfer of knowledge and the extent to which knowledge transfer is a priority for the organization.

Inter-organizational knowledge transfer in the public sector stands to be positively influenced when the organizations that are part of the system are culturally oriented towards knowledge sharing. The model assumes that a knowledge oriented public organization will positively influence a user's intent to transfer knowledge and the perceived effectiveness of the knowledge transfer. This is the case in both the process of transferring, as well as in its outcome. Furthermore, the assumption is made that an organizational culture that is oriented towards knowledge transfer, will positively impact the individual's knowledge transfer intent.

H3: An organizational culture that is oriented towards knowledge management and transfer positively impacts the process of inter-organizational PPP knowledge sharing, searching, and application done by its members.

H4: An organizational culture that is oriented towards knowledge management and transfer positively impacts the inter-organizational knowledge transfer intent of the organization's members.

2.2.2. Knowledge Transfer System Efficiency: Assessing the Quality of the Transfer System

The assessment of the knowledge transfer system's efficiency consists out of two parts. Knowledge transfer in an inter-organizational fashion is not solely done through IT or IS based approaches only. A lot of knowledge is shared and transferred in formal or informal meetings, or with a particular intent that is not necessarily directly linked to information technology. In Nonaka's terms for instance, knowledge transfer instruments that are often cited for the socialization of new workers are: employee rotation, cooperative cross-organization projects, apprenticeships and monitoring programs, learning by observation and learning by doing [18] [38]. Hence the assessment of the efficiency of the transfer system should consist out of an IT-based part and a non-IT-based part, in order to grasp the full extent of the knowledge transfer mechanism that is used to support inter-organizational knowledge transfer. As the system is more efficient in providing access to information, and in transferring knowledge from one organization to another, this will impact the effectiveness of the transfer, through both enabling the ability to search for as well as share and apply knowledge that was sourced in an inter-organizational manner [28].

Operationalized in the context of the public-sector PPP knowledge transfer in Flanders, the perceived knowledge transfer system-efficiency was operationalized in two parts and added to the survey as a part of a set of conditional ques-

tions. Hence before respondents could assess the efficiency of the IT based knowledge transfer system and/or the non-IT based knowledge transfer system, respondents had to indicate which knowledge transfer mechanisms they used. This condition was added as the results towards the assessment of the systems' efficiency may have been distorted when respondents answered questions concerning an IT based KT system, when they weren't even aware of its existence. Hence the conditional set-up was implemented to uphold the quality of the answers and enable a thorough assessment of the current knowledge transfer mechanisms. Questions included in the survey towards the assessment of the systems' perceived efficiency gauged its stability, fluency, and ease of use, structure, accessibility, user-friendliness, cost, content quality and quality of the provided IT-support.

H5a: The perceived efficiency of the IT based knowledge transfer support system positively affects the inter-organizational PPP knowledge transfer activities, *i.e.* knowledge sharing, searching and application of/for knowledge.

H5b: The perceived efficiency of the non-IT based knowledge transfer support system positively affects the inter-organizational PPP knowledge transfer activities, *i.e.* knowledge sharing, searching and application of/for knowledge.

2.2.3. Partner Characteristics

Literature on both alliance formation and inter-organizational knowledge transfer, as well as knowledge governance suggests that organizations that keep close, trust based relations and develop a reciprocal connection on the basis of their reputation in certain fields, tend to transfer inter-organizational knowledge more effectively [18] [24] [26] [28] [30] [34] [39]. The same is true for organizations that are similar in terms of organizational culture and structure, or those that provide open access to the relevant knowledge that they possess. As such, the inclusion of partner characteristics in the inter-organizational knowledge transfer effectiveness model allows for the assessment of the preferences of individuals active in a sector concerning the organizations with which knowledge is shared. In turn this also indicates knowledge transfer intent or motivation, which is impacted as the partner characteristics may trigger reluctance, or increased motivation towards the transfer of knowledge [24] [28] [34].

Operationalized towards the assessment of perceived inter-organizational knowledge transfer effectiveness for PPP related matters in Flanders, questions on partner characteristics and their effect on IOKT included whether IOKT happened due to the close relations between public entities, the trust that existed between public organizations, and the impact the public organizations' PPP reputation had on IOKT. Since Flanders is a relatively small geographical region and given that most of the national and regional level institutions involved with PPP are in Brussels, the physical distance between organizations was not considered.

H6: The relational closeness of organizations positively impacts the inter-organizational knowledge transfer activities, *i.e.* knowledge sharing, searching for knowledge and the application of transferred knowledge.

2.2.4. Knowledge Transfer Intent

Next to the organizational culture of organizations active within a certain sector, the intrinsic motivation of knowledge workers also impacts the transfer of knowledge in an inter-organizational manner. This has to do with elements that are separate from the incentives and organizational support structures that are in place and that may influence individuals in effectively transferring knowledge. Hence, positive attitudes towards the transferring of knowledge within the system or sector stand to positively affect the knowledge transfer activities that take place within a system [40].

Towards the operationalization of knowledge transfer intent, questions were included in the survey that gauge the respondent's curiosity in terms of PPP developments, their openness towards new ideas and their reluctance towards sharing PPP-related knowledge.

H7: Positive attitudes towards the sharing of knowledge in the public sector concerning PPP knowledge positively affect the inter-organizational knowledge transfer activities that take place, *i.e.* knowledge sharing, searching for knowledge and the application of transferred knowledge.

3. Research Method

For the analysis of perceived public sector inter-organizational knowledge transfer effectiveness, concerning PPP knowledge transfer within the Flemish territory, a quantitative research approach was used. This approach, based on a self-completion method, involved gathering numerical data using structured questionnaires, to collect primary data from individuals, *i.e.* survey-based research [40].

The survey used in support of the research was constructed in close cooperation with the Vlaams Kenniscentrum in PPS (Flemish Expertise centre in PPP). Several top-tier Flemish PPP experts evaluated the final version of the survey. A threefold linguistic quality assessment of the survey was made before uploading it, making it into an online survey tool. A 7-point Likert scale was included for each question. Answer categories ranged from totally disagree to totally agree or an equivalent 7-point scale. By means of an online survey management tool, namely Lime Survey v.2.00+¹, made available by the Vrije Universiteit Brussel, respondents were asked to participate in the research. Hence respondents received an invitation via email, in which a URL-link to the survey was provided. The survey was made available online from the 10th of March 2015 until the 30th of April 2015. During this period two reminders were sent, to increase the response rate.

Next to having the option to fill-out the survey online, the survey could also be downloaded, filled-out, and returned to the research team in hard copy. None

¹Limesurvey as a tool has won several awards for, amongst others most promising and innovative free open source software and was ranked amongst the top 10 finalists in the 2008 SourceFourge.net community awards. Limesurvey as a tool is recognized as a valuable tool by over 50 universities worldwide and is freely available to all others.

of the respondents opted to do so. Hence the participation that was received from people in the sample, confirms the usability of the approach. The latter is also confirmed in literature, as the use of web-hosted Internet surveys, in the field of strategic management has increased substantially in the last decade [40].

3.1. Sampling and Population

The objective of the study is to analyze the perceived effectiveness of inter-organizational PPP knowledge transfer in the public sector that takes place on Flemish territory. Hence, the total population of people could be defined as anyone who is or will be actively involved with PPP at the public-sector side in the near future. For the Flemish territory, this means that the potential actors involved with PPP can be located at different policy levels. The main three levels are the national or federal level, the regional or Flemish level and the local or communal level. Other levels exist; yet usually have a limited stake in the initiation, implementation, management and development of large-scale PPP projects on Flemish territory. Our sampling unit is the individual and his/her perception of the knowledge transfer system's effectiveness.

Based on the membership listings of the Vlaams Kenniscentrum PPS, combined with the contacts gathered at the Chair in Public-private partnerships, located at the Vrije Universiteit Brussel, a list with potential respondents was composed. These people were either identified as an active or passive attendee or participant identified by the Flemish expertise centre, or as a public-sector official with an interest in PPP in Flanders which had shown interest in the work performed by the VUB Chair in PPP. Other potential respondents were gathered through desktop research and by a thorough revision of lists of attendees at PPP related events that took place in Flanders in the period from 2012-2014. From such lists, people still active at the public-sector side were selected and added to the list.

In doing so a dual sampling method was applied, *i.e.* referral sampling combined with convenience sampling [40]. At first a referral from the Vlaams Kenniscentrum PPS served as to form the basis of our set of respondents. The expertise centre in PPP identified a total of 150 respondents. Through additional research and the combination of several resources the research team was eventually able to identify 400 potential candidates for participation in the survey. Cross-validation with PPP experts in Flanders did however reveal that this is an overestimation of the total population. Approximations on the actual number of people active at the public-sector side in PPP on Flemish territory are significantly lower than the 400 people identified through the research. Nonetheless, this is not problematic as the identified set of respondents includes people that might become active in PPP, as well as people that are already active in PPP.

From the initial 400 people that were selected to participate in the study, the online survey tool LimeSurvey v. 2.00+ indicated that 131 (completed (71) and partially completed (60)) surveys were returned. Thus, indicating a response-rate for completed surveys of approximately 17.7%.

3.2. Use of Partial Least Squares Structural Equation Modelling (PLS-SEM)

Structural equation modelling (SEM) is among the most useful advanced statistical analysis techniques of multivariate analysis that combine aspects of factor analysis and regression, enabling the research to simultaneously examine relationships among measured variables and latent variables, as well as between latent variables. While there are many approaches to conducting SEM, the most widely applied method is certainly covariance-based SEM (CB-SEM) [41]. This has led to a situation wherein not all researchers are aware of the variance-based partial least squares SEM (PLS-SEM) approach, which is an alternative technique for SEM, and which has become a key research method. Hair *et al.* (2014) summarize the studies on PLS-SEM as published in top journals in marketing and strategic management disciplines [41]. Their analysis shows that the use of PLS-SEM has increased exponentially since 1980 and knows accelerated application from 2010 onwards. This is largely due to the recognition that PLS-SEM's distinctive methodological features make it a viable alternative to the more popular CB-SEM approach [41].

The advantages of PLS-SEM that are commonly identified in the literature are amongst others, its ability to run analyses even when sample sizes are small, when data is non-normally distributed, or when complex models with many indicators and model relationships are estimated. In addition, PLS-SEM can easily handle reflective and formative measurement models, as well as single-item constructs, with no identification problems. PLS-SEM is therefore a highly versatile research method, with a high efficiency in parameter estimation, which is manifested in the method's greater statistical power, than that of CB-SEM. However, PLS-SEM is not less stringent than CB-SEM, rather it is a complimentary approach to SEM [41]².

Restrictions, Conditions and Consequences

Several authors have also emphasized the importance of minimum sample size requirements, needed to perform PLS-SEM. Overall the complexity of a structural model has little influence on the sample size requirements, as the algorithm does not compute all relationships at the same time. As the algorithm uses OLS regressions to estimate the model's partial regression relationships, this improves performance of PLS-SEM even when small samples are used. Moreover,

²PLS-SEM fits the constructed model to the sample data to obtain the best parameter estimates by maximizing the explained variance of the endogenous latent variables. This aspect of PLS-SEM is different from covariance-based SEM, which estimates parameters so that the differences between the sample covariance and those predicted by the theoretical model are minimized. As a result with covariance-based approaches, the covariance matrix implied by the theoretical model is as close as possible to the sample covariance matrix. As a result goodness of fit measures that inform researchers on the robustness of the model, such as the chi-square measure, calculated based on the difference between the covariance matrices are not applicable in a PLS-SEM context. Instead of applying measures of goodness of fit, the structural model in PLS-SEM is assessed on the basis of heuristic criteria that are determined by the model's predictive capabilities. PLS-SEM therefore works under the assumption that the model is specified correctly and is assessed in terms of how well it predicts the endogenous variables (Hair *et al.*, 2014).

when compared to CB-SEM, PLS-SEM has higher levels of statistical power in situations with complex model structures or smaller sample sizes. As a rule of thumb, authors have established that the sample size should be equal to the larger of 1) 10 times the largest number of formative indicators used to measure a single construct, or 2) 10 times the largest number of structural paths directed at a particular construct in the structural model. Such computations do however only hold value, when the sample size is considered against the background of the model and data characteristics [41].

Considering the data distribution and measurement scales, for the PLS-SEM approach, missing values should be dealt with before the analysis can be performed. For reasonable limits, *i.e.* less than 5% missing values per indicator, missing value treatment options such as mean replacement, expectation-maximisation and nearest neighbour generally result in only slightly different PLS-SEM estimations [41]. When the amount of missing data on a questionnaire exceeds 15%, the observation is typically removed from the data file [41]. Moreover, if a high proportion of responses are missing for a single construct, then the entire observation may have to be removed. This implies that out of 130 completed and partially completed surveys, the research was able to include 49 observations in the final PLS-SEM model. Similar to the reduction in observations, the number of indicators used in the final PLS-SEM model is also reduced. Indicators that were included in the survey for the evaluation of IT based transfer-system efficiency and non-IT based transfer-system efficiency, did not yield sufficient data to be included in the model. The model, which was constructed in SmartPLS v2.0, is shown in **Figure 2**. For this model, the reduced data set was imported into SmartPLS, which in turn allowed for estimates to be calculated for the model. The results of which are discussed in the following paragraphs. Given

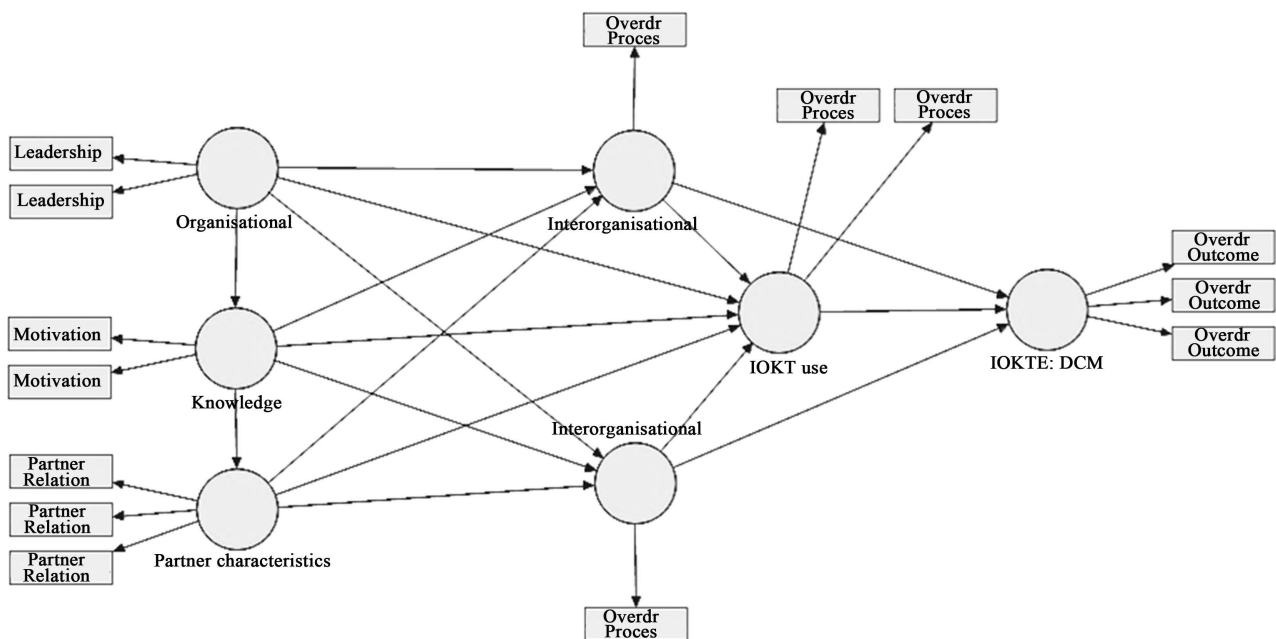


Figure 2. SmartPLS: IOKTE model.

the fact that the PLS SEM model used to test the hypothesis in the IOKTE model has one construct to which 5 structural paths lead, this means that the necessary minimum sample requirements are not met. Due to the strict application of the SmartPLS modelling requirements (max. 15% missing values per observation), only 49 observations made it into the sample. Given that this is the smallest possible deviation from the required sample size and the fact that PLS-SEM works well under conditions of small samples, a choice was made to run the model nonetheless, even given this very small deviation from the sample requirements.

4. Results

For the presentation of the findings, the preference is given to address the descriptive statistics first, as these add more depth to the findings, before addressing the application of the hypothesis testing for the IOKTE model.

4.1. Descriptive Statistics

4.1.1. Sample Composition

To be able to differentiate the respondents in the sample, several questions were added to the survey that gauges the socio-economic characteristics of the respondents. These are identification questions such as the policy level at which a respondent is active, the public organization one works for or the level one has within this organization.

Concerning the distribution of respondents across policy levels, the results in **Table 1** indicate that almost half of the sample is active at the Flemish regional level. This however, is to be expected as the regional level has been granted substantial say in most public domains and state affairs. State reform in Belgium has seen a substantial redistribution of state power, in which the regional entities have gained the most direct say in many policy fields. As a result, for PPP, which is found at many of these policy levels, the regional policy level is the central or key player. Nonetheless, given that the data-collection is aimed at the inclusion

Table 1. Descriptive statistics: sample composition, policy level representation.

Policy level	Frequency distribution percentage
The supranational level	1.01%
The national (federal) level	17.17%
The regional (Flemish) level	51.52%
The provincial level	1.01%
The municipal level	23.23%
The district level	0.00%
Other	3.03%
No answer	3.03%
*n	99

*n is the number of responses retrieved through the data collection for this topic.

of all policy levels active on Flemish territory, a substantial part of the sample consists out of respondents active at the federal and municipal levels. This is as to be expected, since these two levels, next to the regional policy level, have the most vested interest in the initiation, implementation and monitoring of PPP projects that take place on Flemish soil.

Pertaining to the level at which respondents are active within their respective public organizations, the results in **Table 2** indicate that there is a clear representation in the sample of the higher-levels of management in the public organizations that are represented in the sample. The majority of respondents is either active at the level of CEO, N-1, or N-2 level. This is an important finding, as the managerial activity, *i.e.* managing and transferring PPP knowledge is dependent on the involvement of top-level leadership and should happen at the highest organization levels.

4.1.2. Control Variables: PPP and TPP Experience

Several questions were added to the survey, which aim at uncovering the experience-level of respondents with the PPP and traditional public procurement methods (TPP) used on Flemish territory. **Figure 3** offers a visual comparative representation of respondents' experience levels.

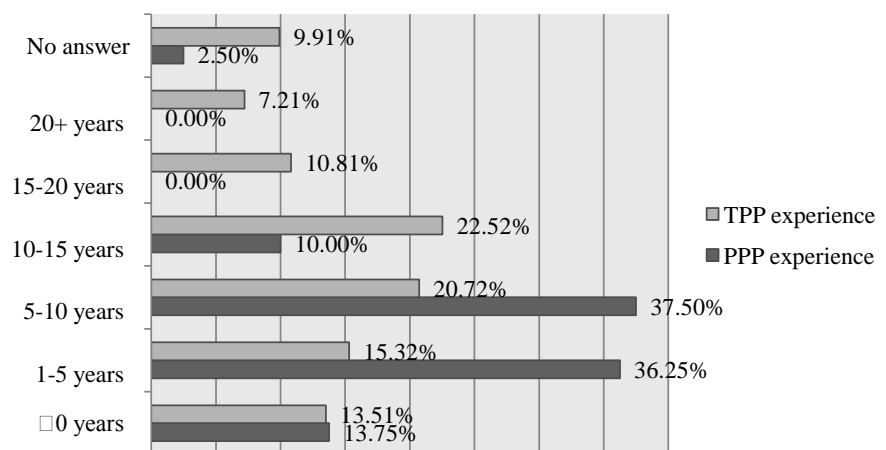


Figure 3. Descriptive statistics: TPP & PPP experience comparison.

Table 2. Descriptive statistics: sample composition, managerial level.

Managerial level	Frequency distribution percentage
N (level of CEO)	17.17%
N-1 (first line connection to N)	24.24%
N-2 (first connection to level N-1)	33.33%
N-3 (first connection to level N-2)	6.06%
N-4 (first connection to N-3 level)	1.01%
Other	10.10%
No answer	8.08%
*n	99

Figure 3 indicates that the experience respondents have in number of years is different in the sample for the TPP and PPP type of public procurement. This however does not come as a surprise, given that PPP in Flanders was first introduced in the policy domain in 2003. Hence the fact that respondents indicate to have less years of experience with PPP than with TPP is to be expected, given that TPP approaches have existed far longer within this region.

In terms of the types and number of PPP projects respondents have been involved in, **Figure 4** indicates that this exposure has been rather narrow. Hence exposure to PPP does not often exceed 1 - 5 projects that have a capital expenditure (CAPEX) of between €5 - 100 million. However, chances are that the same people involved in smaller projects, have also been involved in the somewhat larger projects. There is however no information available to check the overlap between categories. What does stand out is that only a very small fraction of respondents indicates to have been involved in a higher number of projects. This would indicate that certain individuals active within one or more public sector organizations in Flanders exhibit a concentration of practical knowledge in PPPs.

4.1.3. Endogenous Variables

1) Inter-organizational knowledge transfer effectiveness: decision-making capability:

For the construct perceived knowledge transfer effectiveness, the survey included several indicators in the survey. Certain of these indicators are aimed at uncovering the extent to which PPP IOKT in Flanders contributes to the decision-making capability or capacity of individuals and organizations active in public sector organizations involved with PPP. The results, shown in **Table 3** indicate that the largest portion of respondents agrees with the statement that IOKT aids decision-making (DCM) and confirm that this is also the case in real-life. Respondents indicate that this transfer is beneficial, aids in developing PPP-related skills, whilst improving the PPP decision-making capacity at the public-sector side in Flanders.

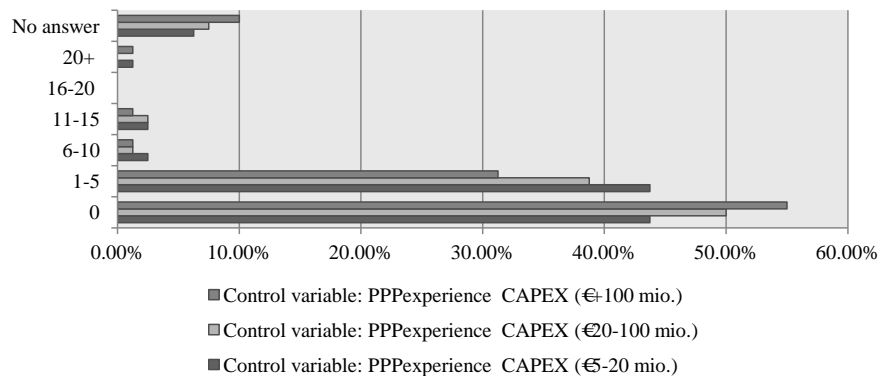


Figure 4. Descriptive statistics: PPP experience, project size and exposure differentiation. *Number of responses retrieved is 80 for each of the three CAPEX categories. **Experience is expressed in number of projects that respondents have been part of.

Table 3. Descriptive statistics: Improvement of PPP-related decision-making.

Answer	Insights	Skills	Decision-making
Totally disagree	0.00%	0.00%	0.00%
Disagree	9.20%	5.75%	4.60%
Tend to disagree	5.75%	3.45%	5.75%
Neutral	8.05%	5.75%	10.34%
Tend to agree	20.69%	24.14%	25.29%
Agree	25.29%	27.59%	20.69%
Strongly agree	13.79%	13.79%	11.49%
No answer	17.24%	19.54%	21.84%
n	87	87	87

*DCM stands for decision-making capacity; **n is the number of responses retrieved through the data collection.

2) The application of sourced PPP knowledge, searching for and sharing of PPP knowledge:

Table 4 indicates that overall, respondents tend to agree, to fully agree with the statement that they apply PPP knowledge that they sourced at different public sector organizations to perform their PPP related tasks. This is a crucial insight, as the use of the transferred knowledge in real life indicates that it is important to further follow-up on what the importance of this type of knowledge is compared to other non-public sources of PPP knowledge. This allows for further investigations into the importance of the knowledge to be made.

4.1.4. Exogenous Variables

For the first exogenous variable, *i.e.* the organizational culture in which the research participants are active, the findings shown in **Table 5** indicate that the largest part of respondents indicates that for their respective organizations PPP related knowledge management is to some extent seen as a necessity and that the overall conception of knowledge management within their organization is that knowledge management is crucial to the success of projects.

The results shown in **Table 5** further indicate that the respondents included in the sample are willing to transfer their PPP related knowledge and are inquisitive towards what is happening in the PPP market or context that they are part of. Given the sample size this insight allows us to conclude that PPP related knowledge is sought after on a continued basis by a substantial part of the sample. It also indicates that a substantial part of the respondents are willing to share their experiences with and knowledge on PPP, therefore granting access to their insights and potentially aiding the advancement of insights made by other public sector stakeholders.

Towards establishing the partner characteristics that best explain the inter-organizational transfer of PPP related knowledge between public sector organizations involved with PPP in Flanders, the results shown in **Table 5** also indicate that for the elements studied in this case, the factors inter-organizational trust

Table 4. Descriptive statistics: inter-organizational PPP knowledge transfer in Flanders.

Answer	Use of IOKT		Activity 1	Activity 2
	Current IOKT use 1	Current IOKT use 2	Knowledge sharing	Searching for knowledge
Totally disagree (A1)	4.60%	4.60%	6.90%	8.05%
Disagree (A2)	5.75%	6.90%	10.34%	8.05%
Tend to disagree (A3)	11.49%	8.05%	8.05%	8.05%
Neutral (A4)	8.05%	10.34%	5.75%	4.60%
Tend to agree (A5)	13.79%	14.94%	14.94%	16.09%
Agree (A6)	22.99%	18.39%	20.69%	25.29%
Strongly agree (A7)	14.94%	17.24%	18.39%	14.94%
No answer	18.39%	19.54%	14.94%	14.94%
N	87	87	87	87

Table 5. Descriptive statistics: Exogenous variables.

Answer	Exogenous variable 1		Exogenous Variable 2		Exogenous variable 3		
	Organizational culture		Transfer intent		Relational distance		
	PPP KM is necessity	KM is crucial for success	Inquisitive towards PPP matters	Willing to share PPP knowledge	IO trust	Reputation	Relational distance
Totally disagree	4.11%	2.74%	0.00%	0.00%	2.78%	4.17%	2.78%
Disagree	8.22%	4.11%	0.00%	0.00%	8.33%	6.94%	6.94%
Tend to disagree	12.33%	8.22%	2.82%	2.82%	4.17%	4.17%	5.56%
Neutral	15.07%	13.70%	9.86%	7.04%	16.67%	16.67%	11.11%
Tend to agree	17.81%	19.18%	21.13%	16.90%	16.67%	26.39%	25.00%
Agree	10.96%	20.55%	26.76%	45.07%	26.39%	16.67%	22.22%
Strongly agree	13.70%	17.81%	29.58%	18.31%	2.78%	4.17%	5.56%
No answer	17.81%	13.70%	9.86%	9.86%	22.22%	20.83%	20.83%
n	73	73	71	71	72	72	72

*n is the number of responses retrieved through the data collection.

(IO trust) experienced between organizations, the reputation organizations have in terms of PPP, and the fact that prior relations exist between the organizations all influence the transfer of PPP knowledge between public sector organizations. The latter however needs to be studied further as to uncover which public sector organizations have the best PPP reputation within the collection of public sector organizations involved with PPP in Flanders. Possibly by including stakeholder opinions that are located outside of the public sector, thereby providing further insight into the network composition that exists within the PPP public sector in Flanders and by providing this transparency, simultaneously increasing the access to information and PPP knowledge across policy levels.

4.2. Additional Descriptive Insights

4.2.1. Knowledge Quality and Knowledge Resource Composition

Table 6 provides a summary of the results that were gained for the assessment of the quality of the knowledge that is currently transferred between public sector organizations in relation to PPP knowledge in Flanders. These results indicate that the knowledge is to some extent significant, understandable and practical, *i.e.* holds value for the performance of PPP related tasks, with sufficient quality to perform these tasks. Yet, in comparison to the agreement that was found in the discussion of the constructs that were used in the IOKTE model, less congruence or similarity is found in these responses. The latter is also found in the results pertaining to the ability of the currently transferred knowledge to improve task performance. The opinions that were voiced through the collection of the data are divided on the matter.

Table 6 also summarizes findings related to the composition of the PPP knowledge sources that are found and shared between public sector organizations in Flanders. These findings indicate that respondents do not find that there is an over-abundance of information and PPP knowledge. This is crucial as too much knowledge, may generate a knowledge overload, making it harder to come to decisions and solve problems, thereby obscuring the useful from the less useful knowledge and or insights. For the question related to whether the knowledge that is available at the moment on PPP in Flanders is too limited, answers are more divided. What does however stand out is that respondents tend to agree with the statement that the knowledge that resides at the public-sector side is too fragmented, making it harder to fully grasp the PPP knowledge that is available and come to an improved understanding of the experiences that have been gained within the public sector related to PPP.

Table 6. Descriptive statistics: PPP knowledge quality and source composition.

Answer	Knowledge quality			The composition of PPP knowledge sources		
	Significant, understandable, practical	Sufficient for tasks performance	Enables improvement	Abundant	Limited	Fragmented
Totally disagree	0.00%	1.32%	0.00%	2.63%	0.00%	0.00%
Disagree	5.26%	2.63%	7.89%	11.84%	7.89%	1.32%
Tend to disagree	9.21%	7.89%	15.79%	23.68%	19.74%	9.21%
Neutral	17.11%	19.74%	25.00%	18.42%	11.84%	10.53%
Tend to agree	22.37%	21.05%	14.47%	5.26%	15.79%	21.05%
Agree	14.47%	14.47%	7.89%	6.58%	7.89%	22.37%
Strongly agree	1.32%	1.32%	0.00%	0.00%	5.26%	6.58%
No answer	30.26%	31.58%	28.95%	31.58%	31.58%	23.60%
n	76	76	76	76	76	72

*n is the number of responses retrieved through the data collection.

4.2.2. Transfer Mechanism Use

The knowledge transfer mechanisms that are used the most for transferring PPP knowledge between public sector organizations in Flanders respondents indicate that this is primarily based on interpersonal contacts, as can be seen in **Table 7**. These interpersonal transfers can be structured such as in training and education, but can also be more sporadic or ad-hoc during brief or extended contact moments, and can happen not only with public sector actors, but can also include private sector interactions. The same rather inter-personal approach underpins “participation in a PPP” as a transfer mechanism, as one is immersed into the complexity and reality of PPP projects, thereby gaining insights on the go. A community of PPP practitioners (CoP) also serves as a vehicle towards the dissemination of PPP knowledge within the public sector in Flanders. The pronounced absence of internships directed towards PPP knowledge transfer, IT systems and PPP databases, and PPP specialization catalogues or registries are however striking.

4.2.3. Transferred Types of Knowledge

With regards to the type of knowledge that is transferred the most amongst public sector actors, the results shown in **Table 8** indicate that best practices and lessons learned and legal and contractual knowledge are the most transferred knowledge types. Both elements are codified forms of knowledge that are easily transferrable once created. Best practices and lessons learned often consist out of written documents or presentations, which can be sent to PPP practitioners via e-mail or through some other outlet. Legal documents also must be in writing and are therefore also more easily transferrable. However, the latter would indi-

Table 7. Descriptive statistics: PPP KT mechanism use.

PPP IOKT mechanism use in Flanders	
Knowledge transfer mechanism prioritization	Percentages
Personal contact moments	53.01%
Training and education	51.81%
By participating in a PPP	50.60%
Through interaction with experts PPP (private sector)	43.37%
The use of existing best practices.	37.35%
A community of PPP professionals	34.94%
Cooperative projects.	27.71%
Access to data through pages on the Internet	24.10%
The transfer of employees	7.23%
Access to databases	4.82%
Other	1.20%
Internships	0.00%
IT system interface and database	0.00%
A shared phonebook with specialization	0.00%

Table 8. Descriptive statistics: PPP knowledge types, most often transferred.

Most IO transferred knowledge on PPP in Flanders	
Type	Percentage
Best practices and lessons learned	24.18%
Legal/contractual knowledge: legal obligations, risk allocation, risk management	21.01%
Experience regarding the interaction with the private sector and the expectations associated with this	14.40%
Expertise of the persons active in public side PPS on Flemish territory	12.43%
Guidance: Flemish PPP Knowledge Centre, EIB, OECD	11.28%
Technical knowledge: design requirements, construction details, scope of a project	9.81%
Commercial knowledge: payment mechanisms, financial models and cost comparisons	6.89%

cate that these contracts are not confidential and therefore accessible to others. The least transferred knowledge is either commercial knowledge on payment mechanisms, financial models and cost comparisons, or technical knowledge on design requirements, construction details or project scopes. A great deal of consultancy work is outsourced to the private sector on these topics, which may therefore explain the lesser need for transferring this type of information. However, these are crucial elements for PPP projects, in direct relation to the long-term investments that are often made in these projects. This does not explain why legal documents would be transferred, as a lot of consultancy work is also outsourced towards this end. Hence further research needs to consider why these types of knowledge are transferred substantially less than their best practice and legal documentation counter parts.

4.2.4. Potential Improvements to the Current Knowledge Transfer Mechanisms

Table 9 provides an overview of 6 elements that were listed as potential improvements towards the future of PPP knowledge transfer that takes place amongst public sector organizations in Flanders. The resulting responses indicate that there is a need for a more centrally coordinated knowledge management approach towards the management of PPP knowledge. This can, according to some be aided by the integration of an IT knowledge sharing system, yet this voice is not shared unequivocally. Larger congruence towards confirmative responses is found related to the need for increased cross-policy level access to PPP knowledge, improved PPP documentation and the expansion of the existing community of practitioners lead by the Vlaams Kenniscentrum PPS. Future research may want to further uncover the drivers for the improvement of the PPP knowledge management service at the different policy-levels involved in PPP in Flanders. As such strategies can be developed to serve the needs of types of public sector entities even further.

Table 9. Descriptive statistics: PPP knowledge transfer improvements for IOKT in Flanders.

Answer	Potential improvements to the IOKT system					
	Need IT based IOKT system	Need central K coordination centre	Need for cheaper IOKT process	Need for cross-policy level access	Need improvement documentation	Need CoP'
Totally disagree	1.43%	2.86%	2.86%	0.00%	0.00%	2.86%
Disagree	8.57%	4.29%	2.86%	4.29%	1.43%	2.86%
Tend to disagree	4.29%	1.43%	2.86%	4.29%	2.86%	7.14%
Neutral	8.57%	17.14%	31.43%	11.43%	5.71%	15.71%
Tend to agree	21.43%	18.57%	8.57%	14.29%	21.43%	14.29%
Agree	25.71%	21.43%	11.43%	31.43%	35.71%	24.29%
Strongly agree	2.86%	10.00%	8.57%	8.57%	8.57%	8.57%
No answer	27.14%	24.29%	31.43%	25.71%	24.29%	24.29%
n	70	70	70	70	70	70

Cop: Community of practitioners

*n is the number of responses retrieved through the data collection.

4.3. PLS Path Model Analysis

4.3.1. Measurement Models

Assessing the reflective measurement models included in the PLS-SEM in terms of their reliability and validity, following Hair *et al.* (2014) starts by looking at the internal consistency reliability [41]. This measure traditionally relies on the Cronbach's alpha criterion for internal consistency, yet assumes that all indicators are equally reliable or that all indicators have equal outer loadings on the construct [41]. As PLS-SEM prioritizes the indicators according to their individual reliability, and because the Cronbach's alpha criterion is sensitive to the number of items in the scale, this results in a general tendency for the Cronbach's alpha criterion to underestimate the internal consistency reliability. Therefore, in PLS-SEM a different measure of internal consistency reliability is used, *i.e.* composite reliability [41]. This type of reliability considers the different outer loadings of the indicator variables and is generally interpreted in the same way as Cronbach's alpha (Hair *et al.* 2014). As the composite reliability for the reflective measurement models included in the IOKTE model are all well above the 0.70 threshold, as can be seen in **Table 10**, it is safe to say that the internal consistency of the reflective measurement models is obtained.

The convergent validity, which is the extent to which a measure correlates positively with alternative measures of the same construct and indicates how much of the variance is shared amongst the construct's indicators, is expressed as the average variance extracted or AVE [41] [42]. This criterion is defined as the grand mean value of the squared loadings of the indicators associated with the construct, or expressed differently, the communality of a construct. An AVE value of 0.50 or higher indicates that, on average, the construct explains more than half of the variance of its indicators [41]. For the IOKTE model, as can be

Table 10. Reflective measurement model assessment: validity and reliability.

Reflective measurement model assessment						
Latent variable	Indicators	Indicator reliability (+0.708)	Internal consistency reliability (+0.60)		Convergent validity	Discriminant validity
		Loadings	Composite reliability	Cronbach's Alpha	AVE	AVEROOT > CORR
Organizational culture	Leadership [SQ002]	0.906	0.898	0.773	0.815	Y
	Leadership [SQ004]	0.899				
Transfer intent	Motivation [SQ001]	0.813	0.838	0.619	0.722	Y
	Motivation [SQ003]	0.885				
Inter-organizational trust	Partner Relation [SQ001]	0.887	0.938	0.902	0.835	Y
	Partner Relation [SQ002]	0.934				
	Partner Relation [SQ003]	0.920				
IOKT knowledge use	Overdr Proces EFFECT [SQ007]	0.968	0.967	0.931	0.935	Y
	Overdr Proces EFFECT [SQ008]	0.967				
Decision-making improvement	Overdr Outcome EFFEC [SQ002]	0.891	0.942	0.908	0.844	Y
	Overdr Outcome EFFEC [SQ005]	0.914				
	Overdr Outcome EFFEC [SQ008]	0.950				

seen in **Table 10**, the AVE values for the reflective measurement models are all well above the 0.50 threshold. The communality of the indicators is also reflected in the fact that all outer loadings have values of 0.708 and more.

Discriminant validity finally, which is the extent to which a construct is truly distinct from other constructs by empirical standards, can be assessed by application of the Fornell-Larcker criterion, which compares the root of the AVE values with the latent variable correlations. As such, the square root of each construct's AVE should be greater than its highest correlation with any construct [41]. This is the case for all reflectively measured constructs included in the IOKTE model³.

According to Hair *et al.* (2014), once the construct measurements are assessed and found to be reliable and valid then the assessment of the structural model involves examining the model's predictive capabilities and the relationships between the constructs. This can however only happen after the model is checked for collinearity [41]. This is because the model is based on OLS regressions for

³An application of the Fornell-Larcker criterion can be found in **Annex 1**.

each endogenous latent variable on its corresponding predecessor constructs. This means that just as in regular multiple regressions the path coefficients might be biased if the estimation involves significant levels of collinearity between the predictor constructs [41]. Overall goodness of fit statistics are however not applicable in the PLS-SEM context. Instead of applying measures of goodness of fit, the structural model in PLS-SEM is assessed based on heuristic criteria that are determined by the model's predictive capabilities⁴. The key criteria for assessing the structural model in PLS-SEM are the significance of the path coefficients, the level of the R² values, the f² effect size, the predictive relevance Q² and the q² effect size [41].

4.3.2. Structural Model: Assessment of the Model's Validity and Significance

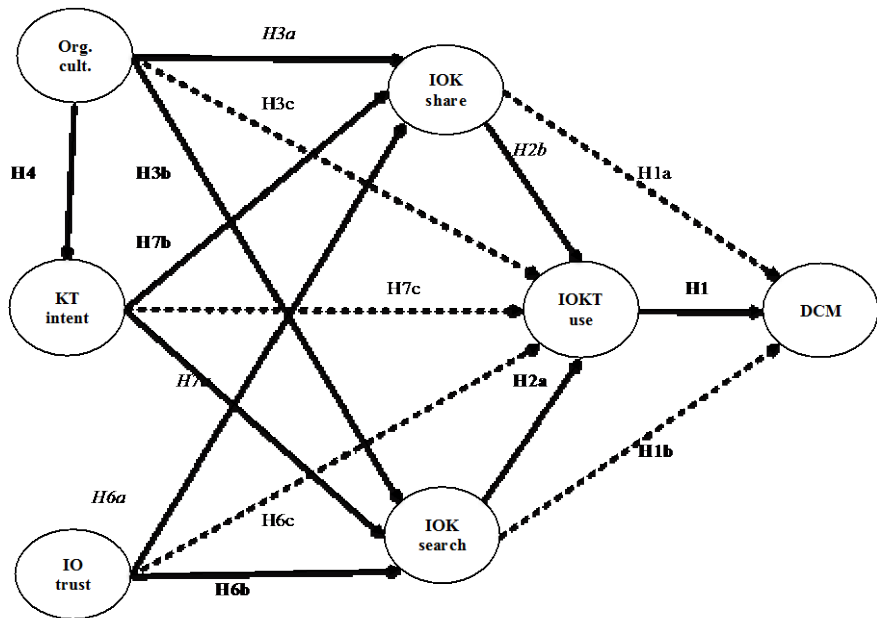
1) Collinearity in the structural model

Following Hair *et al.*, (2014), in order to assess the collinearity of the predictor variables a measurement of VIF is used in order to examine each set of predictor constructs separately for each subpart of the structural model. To do so the predictor variables are used as the independent variables in a linear regression and tested against a random dependent variable. Extracting the latent variable scores from the structural model and using these as the input for the linear regression in IBM SPSS statistics package v.22 [41] allows for this assessment to be made. The results of this analysis are shown in **Table 11**. The table shows that neither the crucial tolerance limit (lower than 0.20) is exceeded by any of the constructs, nor do the VIF values exceed the crucial value of 5. Hence collinearity amongst the predictor constructs is not an issue in the structural model.

2) Significance of path coefficients

After running the PLS algorithm, estimates are obtained for the structural model relationships, *i.e.* the path coefficients, which represent the hypothesized relationships among the constructs, see **Figure 5**. Hair *et al.* (2014) state that estimated path coefficients close to an absolute value of 1 represent a strong relationship, either positive or negative. Significance of the path coefficients is however established through a bootstrap procedure in which the standard error for each construct is calculated, hence allowing for the calculation of the empirical t-values [41]. For an exploratory study such as this one, we assume a significance level of 10%, as our objective is to explore the perceived fitness of this particular knowledge transfer activity, and not to develop extensive generalization on the operationalization of the IOKTE model as presented here. The results of the PLS-SEM algorithm and bootstrapping procedure for the PPP-IOKTE model's significance tests can be found in **Table 12** and **Table 13**. These results indicate that several of the hypothesized relationships between the constructs included in the model show strong (positive) relationships.

⁴Goodness of fit measures and or model robustness measures can be gathered through applications of a model in CB-based approaches such as LISREL and AMOS. However, such CB-based approaches are much less capable of handling small sample sizes and non-normally distributed data. Hence, for this research endeavour the method presented by Hair *et al.* (2014) is followed.



Legend
Bold : Hypothesis confirmed
Italic: Hypothesis rejected
 Dotted line: mediated relationships
 H5 a, b, c: not included in the model due to insufficient data

Figure 5. Structural PPP-IOKTE path model.

Table 11. Structural path model: collinearity assessment.

Structural model collinearity assessment		
Model part 1	Collinearity statistics	
	Tolerance	VIF
Partner characteristics	0.849	1.177
Organizational knowledge transfer culture	0.669	1.495
Knowledge transfer intent	0.62	1.613
a dependent variable: IOKT use		
Model part 2	Collinearity statistics	
	Tolerance	VIF
Inter-organizational knowledge searching	0.887	1.127
Inter-organizational knowledge sharing	0.887	1.127
a dependent variable: IOKT use		
Model part 3	Collinearity statistics	
	Tolerance	VIF
Inter-organizational knowledge searching	0.565	1.769
Inter-organizational knowledge sharing	0.872	1.147
IOKT use	0.631	1.585
a dependent variable: IOKTEDCM		
Control model	Collinearity statistics	
	Tolerance	VIF
Age	0.845	1.183
PPP experience	0.845	1.184
Policy level	0.996	1.004
a dependent variable: IOKTEDCM		

Table 12. Significance testing: structural path model coefficients.⁵

Significance testing: structural model path coefficients									
Hypotheses	Original sample	T statistics	Significance levels	p value	Confidence interval (90%)		(M)	(STDEV)	(STERR)
					LB	UB			
Age -> IOKTE: DCM	-0.2664	2.1255	**	0.039	-0.473	-0.060	-0.2593	0.1253	0.1253
IOKT use -> IOKTE: DCM	0.6707	3.897	***	0.000	0.387	0.955	0.6375	0.1721	0.1721
IO knowledge searching -> IOKT use	0.7379	4.9001	***	0.000	0.489	0.986	0.7349	0.1506	0.1506
Policy level -> IOKT use	0.2166	1.818	*	0.075	0.020	0.413	0.2117	0.1191	0.1191
OK transfer culture -> IO knowledge searching	0.2385	1.9884	**	0.052	0.041	0.436	0.2527	0.1199	0.1199
Partner characteristics -> IO knowledge searching	0.5476	3.3425	***	0.002	0.277	0.818	0.5489	0.1638	0.1638
Knowledge transfer intent -> IO knowledge sharing	0.286	1.7256	*	0.091	0.012	0.560	0.2806	0.1658	0.1658
OK transfer culture -> IO knowledge sharing	0.4542	2.9771	***	0.005	0.202	0.706	0.4687	0.1526	0.1526
OK transfer culture -> Knowledge transfer intent	0.5715	4.8722	***	0.000	0.378	0.765	0.5659	0.1173	0.1173

*Significant at 90% confidence; **Significant at 95% confidence; ***Significant at 99% confidence.

Table 13. Significance testing: total effects.⁶

Significance testing: total effects									
Hypotheses	Original sample	T statistics	Significance levels	p value	Confidence interval (90%)		(M)	(STDEV)	(STERR)
					LB	UB			
IO knowledge searching -> IOKTE: DCM	0.472	2.324	**	0.024	0.137	2.325	0.468	0.203	0.203
OK transfer culture -> IOKTE: DCM	0.294	1.879	*	0.066	0.036	2.100	0.279	0.156	0.156

*Significant at 90% confidence; **Significant at 95% confidence; ***Significant at 99% confidence.

This is the case for the relationship between inter-organizational knowledge transfer use (IOKT use) and inter-organizational knowledge transfer effectiveness (IOKTE: DCM); inter-organizational knowledge searching (IO knowledge searching) and inter-organizational knowledge transfer use; partner characteristics and inter-organizational knowledge searching; organizational knowledge transfer culture (IO transfer culture) and inter-organizational knowledge sharing, and finally organizational knowledge transfer culture and knowledge transfer intent. Significant, yet weaker relationships exist between age and perceived inter-organizational knowledge transfer effectiveness, and organizational knowledge transfer culture and inter-organizational knowledge searching. The weakest significant effects are found for policy level and inter-organizational knowledge transfer use and knowledge transfer intent and inter-organizational knowledge sharing. The total effects analysis shows that inter-organizational knowledge searching significantly impacts perceived inter-organizational knowledge transfer effectiveness, and that organizational knowledge transfer culture also has a weaker significant effect on perceived inter-organizational knowledge

⁵To improve the flow of the document, only the significant relationships are shown. For a full list or the total assessment of the significance testing, details can be found in [Annex 2](#).

⁶To improve the flow of the document, only the significant relationships are shown. For a full list or the total assessment of the significance testing, details can be found in [Annex 3](#).

transfer effectiveness.

3) Determining the coefficient of determination, construct effect size and predictive relevance of constructs

The R2 values, which indicate predictive accuracy, the path coefficients that indicate the strength and direction of the relationship between constructs, as well as the Q2 values and effect sizes that indicate predictive relevance of constructs are shown in **Table 14**. Large effects are found for the effect of knowledge use on decision-making ability improvement, knowledge searching on knowledge use, and organizational culture on knowledge sharing and inter-organisational trust on knowledge searching.

Table 14. Coefficients of determination, construct effect size and predictive relevance of constructs.

Determination, effect size and predictive relevance of the IOKTE constructs									
IOKTE model	R2 included	R2 excluded	f ²	Effect size	Q2 included	Q2 excluded	q ²	Effect size	R adjusted
IOKTE DCM									
IO searching	0.469	0.469	0.000	None	0.386	0.385	0.002	None	0.434
IO sharing	0.469	0.428	0.077	Small	0.386	0.350	0.058	Small	0.434
IOK use	0.469	0.230	0.450	Large	0.386	0.186	0.326	Large	0.434
IOKT Use									
IO searching	0.432	0.224	0.366	Large	0.433	0.245	0.332	Large	0.366
Organizational culture	0.432	0.387	0.079	Small	0.433	0.330	0.181	Medium	0.366
Transfer intent	0.432	0.411	0.037	Small	0.433	0.354	0.140	Small	0.366
IO trust	0.432	0.429	0.005	None	0.433	0.421	0.022	Small	0.366
IO sharing	0.432	0.415	0.030	Small	0.433	0.404	0.051	Small	0.366
IO searching									
Organizational culture	0.504	0.466	0.077	Small	0.484	0.407	0.150	Small	0.471
Transfer intent	0.504	0.503	0.002	None	0.484	0.427	0.110	Small	0.471
IO trust	0.504	0.218	0.577	Large	0.484	0.223	0.505	Large	0.471
IO sharing									
Organizational culture	0.509	0.347	0.330	Large	0.504	0.351	0.308	Large	0.476
Transfer intent	0.509	0.446	0.128	Small	0.504	0.445	0.120	Small	0.476
IO trust	0.509	0.509	0.000	None	0.504	0.231	0.551	Large	0.476
Control model	R2 included	R2 excluded	f ²	Effect size	Q2 included	Q2 excluded	q ²	Effect size	R adjusted
IOKTE DCM									
Policy level	0.535	0.531	0.009	None	0.448	0.378	0.126	Small	0.469
Age	0.535	0.479	0.120	Small	0.448	0.326	0.220	Medium	0.469
PPP experience	0.535	0.510	0.054	Small	0.448	0.363	0.154	Medium	0.469
IOKT use									
Policy level	0.519	0.480	0.081	Small	0.381	0.412	-0.051	None	0.423
Age	0.519	0.500	0.040	Small	0.381	0.434	-0.086	None	0.423
PPP experience	0.519	0.510	0.019	None	0.381	0.432	-0.083	None	0.423

4) Discussion of the results

These findings indicate that the extent to which respondents feel that the public sector inter-organizational PPP knowledge transfer improves PPP-related decision-making is to a large extent explained by the usage of knowledge that was sourced in such an inter-organizational manner. These findings are not surprising, yet important, as the improvement of the PPP knowledge in the public sector can therefore be seen as a priority, which in turn can improve problem solving capacity and ability to foster support for individual decision-making processes. This also indicates that there is a clear need for ample access to information and knowledge on PPPs in the public sector, allowing public organizations to disseminate and search for this particular knowledge.

The extent to which public sector inter-organizational PPP knowledge transfers improve the PPP-related decision making also shows a relation with the act of searching for PPP related information in an inter-organizational fashion. However, the effect that is indicated in the total effects table is fully mediated by the mediating variable knowledge use or, put differently, the actual application of inter-organizationally sourced knowledge in the public sector. This is confirmed through an application of the Sobel test, which delivers a z score of 2,65,884 at a 95% confidence level. The path coefficient for the construct searching for PPP related knowledge in an inter-organizational fashion also increases and becomes significant when the construct knowledge use is removed from the model. Hence confirming the full mediation that is present between inter-organizational knowledge searching and the perceived effectiveness of the knowledge transfer towards decision-making ability or capacity. The total effects therefore indicate that searching for PPP related knowledge in an inter-organizational manner within the public sector, does impact the effectiveness that is experienced in transferring PPP related knowledge between organizations. Hence, once again, reaffirming the importance for access to and structure in the shared knowledge and for the provision of tools and processes may support these searches, as this stand to impact the actual effectiveness of the knowledge transfer.

The latter mediation analysis does not show significant effects for the construct sharing PPP related knowledge inter-organizationally and is confirmed in the absence of significant effects of the latter construct on the perceived effectiveness of the knowledge transfer. The introduction of the control variables age, policy level and PPP experience improve the R2 for the IOKTE: DCM construct, yet their effects are small and have limited predictive relevance as can be seen in **Table 14**. The only control variable that has a significant effect for the improvement of PPP-related decision-making because of inter-organizational PPP knowledge transfer is age. The path coefficient is also negative, so there seems to be a negative relation between age and the extent to which IOKT is perceived to improve PPP related decision-making, therefore implying that there is a difference in the perception older public sector PPP participants in Flanders have, when compared to their younger counterparts in relation to the value that is

added through inter-organizational PPP related knowledge transfer. Further research shall have to investigate which elements may explain this difference.

The absence of data for the constructs perceived IOKT system (non-IT based or IT based) efficiency limits this study from gaining further insight into these factors as explanatory elements in the extent to which PPP related knowledge is used and aids in improving PPP-related decision making in the public sector in Flanders. Since no data was available to test the related hypotheses, the research cannot but state that an efficient IT-based KT system for the transfer of PPP knowledge is not present⁷, hence making it impossible to assess its perceived efficiency and its effect on the perceived effectiveness of the transfer system. The same goes for the perceived efficiency of the non-IT based knowledge transfer system, as here again insufficient data was retrieved to make a final assessment.

Related to the explanation of the extent to which inter-organizationally sourced knowledge is applied, the main explanatory factors are: searching for PPP-related knowledge in an inter-organizational manner and to some extent the policy level control variable.

The fact that searching for knowledge has a significant effect on the application of the inter-organizationally sourced knowledge is a rather simplistic relation, yet is also important, as one cannot apply PPP knowledge without searching for the knowledge first. The fact is however that the relation is positive, which would indicate that searching for PPP knowledge across the boundaries of public organizations also leads to the application of the knowledge that is sourced. By extension this necessitates further understanding of the drivers of this searching activity. The fact that the policy level also shows significant effects towards the application of inter-organizationally sourced PPP knowledge, would indicate that lower policy levels are more inclined to use PPP knowledge that was sourced at the public sector in an inter-organizational manner. Likely explanations for this finding are to be found in terms of access to information and PPP related knowledge. Where organizations located at the lower policy levels may be more willing to share knowledge amongst each other, or should share more knowledge amongst each other due to restricted access to private sector or other knowledge sources. Further research shall however have to delve deeper into the relation between policy level and the use of inter-organizationally transferred PPP knowledge in the public sector in Flanders.

Inter-organizational PPP knowledge transfer, expressed as searching for PPP-related knowledge between public sector organizations is explained in part by the knowledge transfer partner's characteristics, expressed as the extent of inter-organizational trust, which positively impacts the extent of inter-organizational searching for PPP-related knowledge in the public sector. This indicates that

⁷The statement follows the conditionality of questions included in the IOKTE model survey. Respondents were asked to indicate which knowledge transfer mechanism currently are in use to transfer PPP-related knowledge within the public sector in Flanders. None of the respondents indicated that an IT-based transfer system was in place. For the non-IT based system, the number of missing values was too high (more than 15%) thereby excluding it from inclusion in the significance tests used to test the PPP IOKTE model in advance.

people in public sector organizations involved in PPPs that take place on Flemish territory tend to look for PPP-related knowledge at public sector organizations with which trust-based relations exist, or based on the reputation that these organizations have in terms of PPP (which is an extension or expression of trust) *i.e.* reputation-based trust. This is not that remarkable, since PPP as a concept is complex and not all public-sector organizations have the capacity to handle the complexity associated with the topic, nor do they feel a need to expand resources towards such an endeavour. Furthermore, not all public organizations have an interest in PPP-related matters, offering those who may only need momentary access to PPP-related matter the ability to be opportunistic in their knowledge sourcing activities. The idea that reputation is an important factor in the explanation of knowledge transfer as a searching activity also relates to the fact that not all public organizations active within the public sector have made previous investments towards the accumulation of PPP knowledge, hence making PPP knowledge an asset that is connected specifically to certain organizations within the public sector in Flanders.

The second explanatory construct used to explain searching for PPP-related knowledge in an inter-organizational manner is the knowledge transfer culture that is present in the organization one is active in. As a result, the research concludes that an organizational culture based on a belief system and values that are directed towards the inter-organizational transfer of knowledge positively influence the act of searching for PPP related knowledge in an inter-organizational manner. The latter is also confirmed in the fact that a knowledge transfer encouraging organizational culture significantly impacts knowledge transfer intent of the individual's motivation to share PPP-related knowledge in an inter-organizational manner on PPP in the public sector in Flanders.

The sharing of PPP-related knowledge between public organizations finally, is positively impacted by both the individuals' inter-organizational knowledge transfer intent, *i.e.* the individual's willingness to share PPP-related knowledge and the organizational culture within which an individual is active. Indeed, those individuals that are eager to share their knowledge and who are also curious about the goings-on and new developments that take place in the world of PPP stand to share more of their knowledge than their less inquisitive counter-parts. The same is true for individuals who are active within organizations where the management of PPP-related knowledge is experienced as a necessity or more general in organizations where knowledge management is perceived as an absolute necessity towards the successful realization of projects. The latter reaffirms the notion of bounded rationality and its importance for the effectiveness of PPP-related inter-organizational knowledge transfer, by exemplifying that people with particular views and particular backgrounds will partake in particular activities, whilst those with other views will not do so.

Post-hoc statistical power calculations for the four endogenous constructs also reveal that the model has sufficient statistical power to find significant effects (with values of observed statistical power over 0.999) (Soper 2015). As a result,

the research can confidently (95%) state that the relations, or hypotheses included in the model that do not show significant effects, will also not do so at the population level.

5. Conclusions

Knowledge management has been identified as a crucial managerial endeavour for public sector organizations. Knowledge has also been identified as a crucial factor in the successful realization of PPP projects. Excessive or insufficient knowledge assets stand to limit public sector capacity and restrict the development of adaptive problem-solving and decision-making. Consequently, there is need to address how knowledge assets are developed in and between public sector organizations involved with PPP.

A descriptive analysis of the data sourced in support of the analysis presented in this paper indicates that even though experience levels might not be extremely high, the respondents do indicate that the sharing of PPP knowledge amongst public sector entities involved in PPP in Flanders aids their decision-making. It also confirms a large part of the respondents use the knowledge that they source from other public entities on this topic. The latter is also the result of transfer activities such as knowledge sharing and searching for knowledge, which the data inspection confirms, happens as a large part of the respondents included in the sample indicate to perform these two activities. Towards the quality of the knowledge that is currently transferred, the results show that there still is room for improvement, especially towards reducing the fragmentation of PPP knowledge within the public sector. This is connected to the fact that not much structured and codification enhancing knowledge transfer mechanisms are currently employed in the public sector in Flanders when looking at PPP specific knowledge. Suggested improvements are increased centralized coordination of the knowledge, increased cross-policy level access to the PPP knowledge and improved PPP documentation that is more adapted to the end user's needs.

This paper furthermore empirically tests the model developed for the assessment of the perceived public sector inter-organizational knowledge transfer effectiveness and applies it to the knowledge transfer in the public sector on PPP knowledge that exists on Flemish territory. The sample that served to estimate the effects of the variables included in the model was therefore derived from people that, on a range of policy levels and in different types of public sector organizations, are or will be active in PPP in Flanders.

This application of the IOKTE model reveals that certain factors clearly affect the perceived improvement of decision-making ability related to the inter-organisational knowledge transfers on PPP in the public sector. These are the extent to which inter-organizationally sourced PPP knowledge is actually applied, whether it sought after and the age category to which one belongs. PPP-related knowledge transfer amongst public sector organizations in Flanders is therefore directed at instilling coping-mechanisms, which allow for adaptive decision-making strategies to be developed. The act of transferring knowledge between

public organizations on this matter is dependent on, the inter-organizational trust that exists between public sector organizations and their respective reputations. As such the assumption is made that asset-specific investments are made by particular entities only, therefore, providing them with knowledge assets that further their reputation and that attract searching behavior from others. In terms of the sharing of PPP-related knowledge and expertise, the research finds that the main drivers here are the organizational culture within which individuals active in the field of PPP are employed and the extent to which they are intrinsically motivated to keep up with current events and developments within the PPP market. Future research may want to further investigate which organizations are perceived as knowledgeable, which organizations carry the most weight in the public sector and are arguably more reputable than others. This identification stands to further develop the capacity towards problem-solving and decision-making, given that these organizations provide access to their knowledge assets and do this by transcending policy levels.

6. Limitations

6.1. Unobserved Heterogeneity in the Dataset

As the public sector in Flanders is composed of several policy layers, it is highly likely that actors that are active on these different levels experience the effectiveness of the inter-organizational knowledge transfer in a different manner. An analysis of the data-set used in the PLS-SEM application presented in this paper reveals that the composition of the sample is divided over three policy levels in the following manner, 17% of respondents indicates to be active at the national or Belgian federal level, 57% indicates to be active at the regional or Flemish level and 31% indicates that their activities take place on the local municipal level. This division, with a clear stake in the representation for respondents active on the regional level may be a cause of unobserved heterogeneity in the data set. A final multi-group analysis using the SmartPLS algorithm may provide insight into the significance of the group differences [41]. However, as these sub-samples that are to be used in the multi-group analysis are sub-samples of an already fairly small main sample ($n = 49$), we believe that such an analysis may be unreliable and was therefore not incorporated into the representation of the findings. Future research, addressing the public-sector PPP knowledge in Flanders may however want to take this limitation into account when provided with larger samples.

A visual exploration of the data collected in this paper, represented in **Figures 6-8** indicates that the relation between perceived PPP decision-making improvement related to inter-organizational PPP knowledge transfer and the use or application of PPP knowledge generally shows the same direction for the three policy levels that are represented in the sample. The slopes do however differ. The same can be visually assessed for the relation between the application of PPP knowledge and inter-organizational knowledge sharing. For the relation between searching for PPP knowledge in an inter-organizational manner and the actual

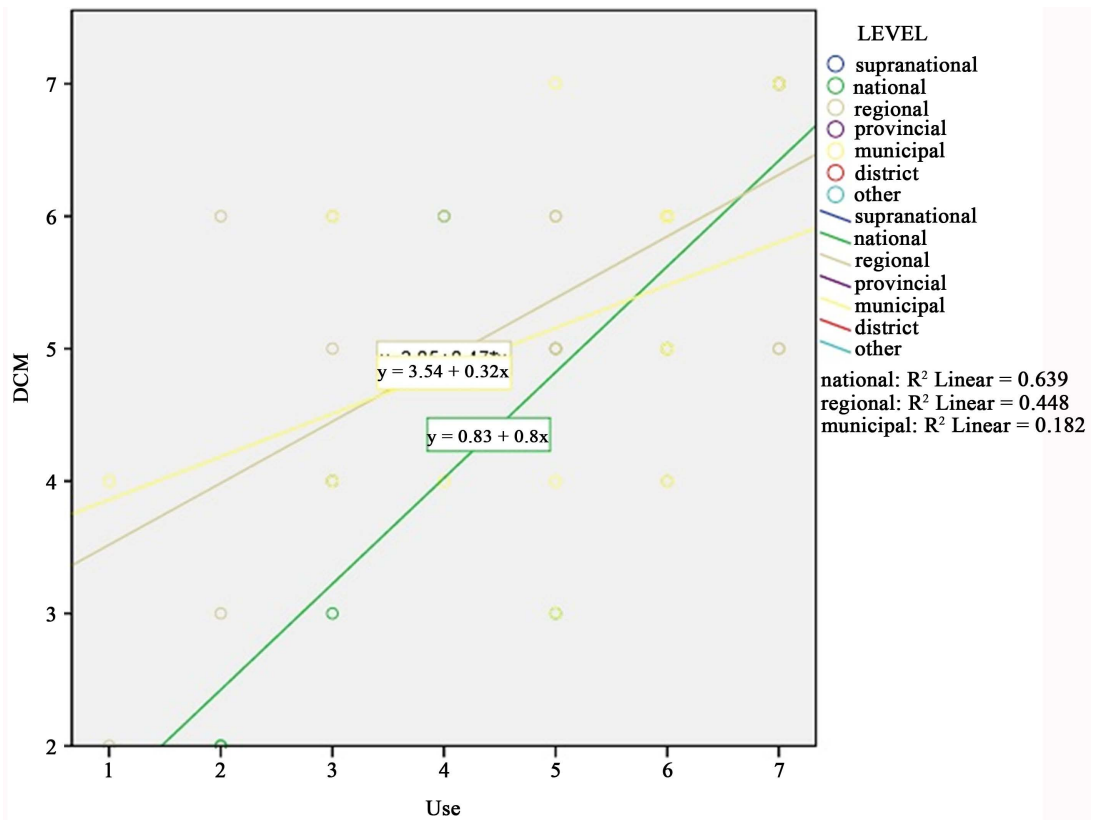


Figure 6. Scatterplot IO PPP knowledge use vs. IOKTE: DCM.

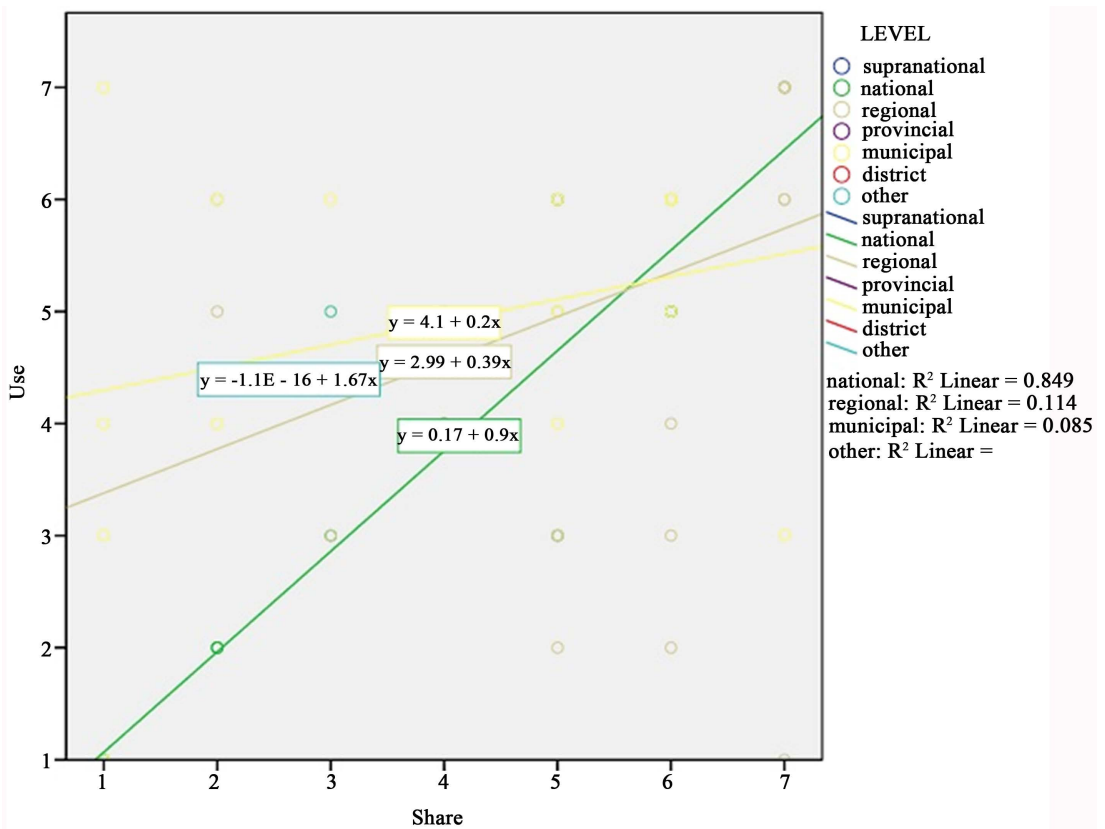


Figure 7. Scatterplot IO PPP knowledge use vs. IO PPP knowledge sharing.

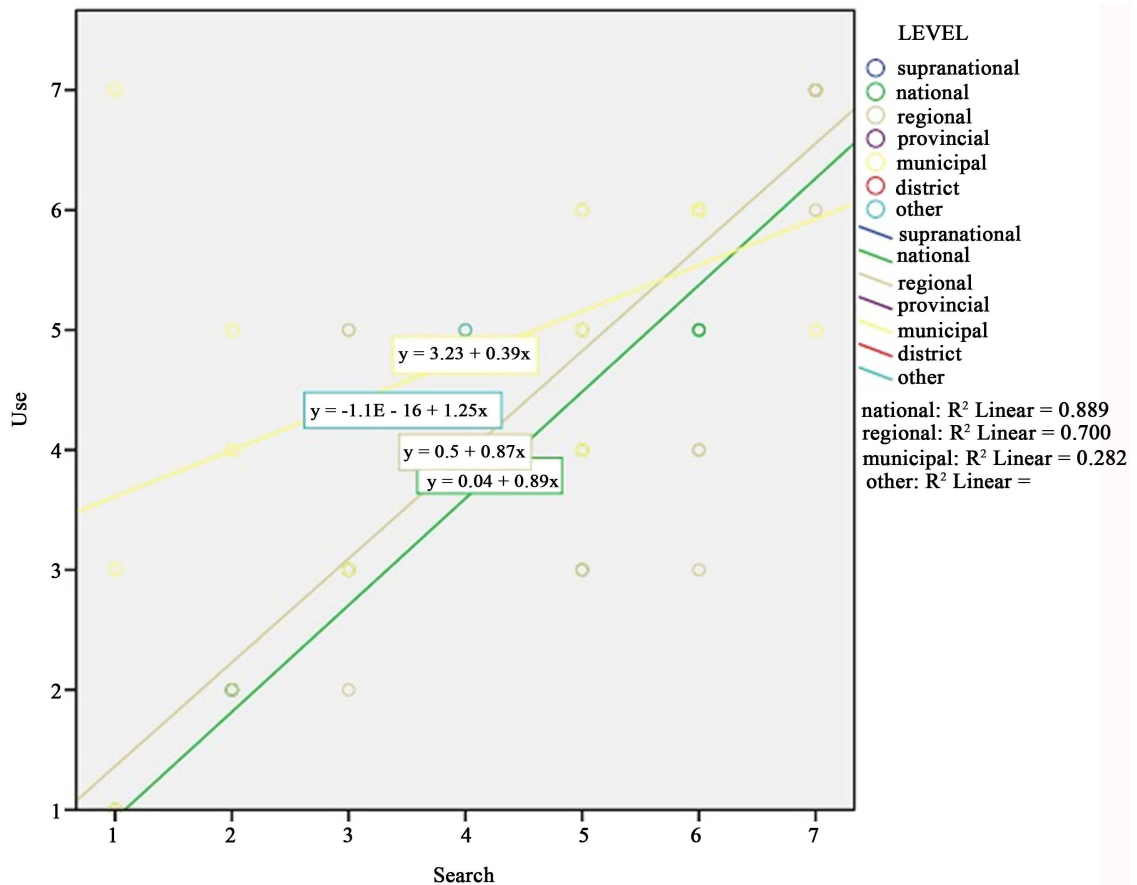


Figure 8. Scatterplot IOK use vs. IOK searching in PPP.

application of inter-organizationally sourced PPP knowledge the visual inspection indicates that not only the direction of the relation, but also the slope of the relation stays the same for 2 of the policy levels represented in the sample. This would indicate that the proposed relationship is the same for these 2 policy levels represented in the sample. Future research, employing larger sample sizes may however want to investigate these issues further in an effort to explain whether the differences are significant and if so, what factors stand to explain these differences. The fact that the sample sizes for the three policy levels are sub-samples from an already limited sample may explain why these differences are found, therefore in future research additional insights stand to gain when data-collection employing larger samples is performed.

6.2. Inter-Organizational Knowledge Transfer Efficiency: IT vs. Non IT-Based Transfer Systems

Crucial to the understanding of the inter-organizational knowledge transfer effectiveness is the impact the efficiency of the overall system has on the ability to share and search for information and knowledge. The conditional approach used in the creation of the research's survey ensured that the data that was sourced from the respondents was correct, as only those respondents that identified certain knowledge transfer mechanisms could assess the systems' efficiency. Con-

sequently, insufficient data was gathered to include systems' efficiency into the IOKTE model. The latter has two consequences. One is that due to an absence of an IT based KT system, there also are no assessments of its efficiency. This absence can therefore not remedy the knowledge fragmentation nor aid the improvement of access to PPP related knowledge. Future research may therefore want to unearth why the adoption of an IT based interface is not installed and which factors are the main barriers towards such a development. In relation to the assessment of the non-IT based knowledge transfer system's efficiency, the research also finds that insufficient data is present to include the gathered data into the IOKTE model. As an IT-based KT system is clearly absent, an assessment of non-IT-based KT system efficiency could have been crucial in explaining the retrieved variance in both perceived IOKT effectiveness as well as the associated user satisfaction. Future research endeavours may therefore want to include non-conditional questions in surveys that aim to uncover the experienced IOKT system's efficiency, thereby generating sufficient data to include the construct in a PLS-SEM model.

6.3. Inter-Organizational Trust and Reputation

Authors such as Blackman and Phillips (2009) suggest that the transfer of knowledge is related to the theory of psychological contract. This theory holds that the primary drivers for knowledge transfer are related to the extent of the functionality experienced in the knowledge transfer, the level of perceived safety in the transfer, the opportunity expressed as in availability in time, location and effects on the stress that is encountered in such interactions [33]. The hereto-presented findings indicate that knowledge is mainly sought after at reputable organizations and those with which trust-based relations exist. Future research may want to delve deeper into the impact inter-organizational trust and reputation have in knowledge ecosystems that are based on largely non-IT driven knowledge exchanges and are developed under conditions of severe complexity.

7. Discussion and Future Research

7.1. The Recursive Nature of Knowledge Ecosystems

Complexity theory and adaptive systems theory nurtures the notion that organizations can foster second-order feedback loops. These processes that make an abstraction of the current goings-on by questioning their added value and capacity towards durable performance are believed to influence some of the variables that are part of the transfer model in recursive manners [43] [44] [45]. Future research, using non-linear models may want to investigate the main causes of knowledge transfer effectiveness for public sector knowledge ecosystems with the inclusion of such feedback structures that allow the transfer to adapt to environmental needs and emergent complexity. This will allow the model, as conceptualized here to be extended, thereby providing greater insight into the complex dynamics that are at the root of inter-organizational knowledge transfer effectiveness in the public sector.

7.2. CoP Membership, Political Restrictions and Experience

Some of the variables that were identified in the literature were not included in the model, yet may have mediating or moderating effects on perceived knowledge transfer effectiveness. These include whether a community of practitioners (CoP) exists within the knowledge context, whether there are restrictions imposed by political forces and the experience an individual has with transferring knowledge in general. Also, the idea of efficiency can be expressed in many different manners, as is the actual effectiveness of the transfer system vis-à-vis the perceived effectiveness. For the operationalization of organizational culture there are also other possible underlying elements that might play a mediating or moderating role. As the research presented here is exploratory, it therefore offers a first exploration of the issues presented here, allowing for future research to further develop included and non-included constructs even further.

Active members in a community of practitioners stand to be better informed and have more exposure to valuable knowledge. These communities often develop organically and are therefore an expression of a knowledge ecosystem [43]. For any specific knowledge ecosystem, researchers could therefore control for active CoP-membership to uncover differences in perception signaled by CoP members and non-members. The latter is important as the higher degree of exposure stands to affect the individual's knowledge base, which impacts their ability to absorb and identify new or relevant knowledge. As individuals become more capable in discerning the knowledge or information that is useful from the knowledge that has less value, it is not unthinkable that this will impact their motivation to share new insights and or search for additional information. Members and non-CoP members might therefore perceive the effectiveness of inter-organizational knowledge transfers differently.

Finally, political influences may have a great impact on the creation of knowledge assets within organizations. This may restrict an individual's ability to share or transfer knowledge to other organizations active within the same knowledge field. This can be due to unwritten policies or directions that need to be followed. The presence of political directives limiting the access to and free sharing of knowledge will therefore negatively impact the effectiveness of inter-organizational knowledge transfer.

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Annexes

Annex 1. IOKTE model, application of the Fornell-Larcker criterion.

	Age	IOKT use	IOKTE: DCM	IO knowledge searching	IO knowledge sharing	Knowledge transfer intent	OK transfer culture	PPP experience	Partner characteristics	Policy level
Age	0.965									
IOKT use	0.121	0.953								
IOKTE: DCM	-0.097	0.650	1.000							
IO knowledge searching	-0.130	0.599	0.444	1.000						
IO knowledge sharing	0.068	0.102	0.274	0.336	1.000					
Knowledge transfer intent	-0.073	0.101	0.210	0.400	0.591	0.787				
OK transfer culture	0.038	0.330	0.356	0.427	0.665	0.572	0.879			
PPP experience	0.393	0.032	0.150	-0.175	0.230	0.256	0.217	1.000		
Partner characteristics	-0.174	0.328	0.225	0.663	0.238	0.381	0.279	-0.240	0.950	
Policy level	-0.048	0.090	-0.049	-0.194	-0.335	-0.301	-0.294	-0.053	-0.015	1.000

Annex 2. IOKTE model, full effects structural model significance test.

Significance testing results of the structural model path coefficients	Original sample (O)	T statistics (O/STERR)	Significance levels	p value	Confidence interval (90%)		(M)	(STDEV)	(STERR)
					LB	UB			
					Age -> IOKTE: DCM	-0.266			
IOKT use -> IOKTE: DCM	0.671	3.897	***	0.000	0.387	0.955	0.638	0.172	0.172
inter-organizational knowledge searching -> IOKTE: DCM	-0.023	0.102	NS	0.919	-0.397	0.351	-0.009	0.227	0.227
inter-organizational knowledge sharing -> IOKTE: DCM	0.189	1.317	NS	0.194	-0.048	0.426	0.206	0.144	0.144
PPP experience -> IOKTE: DCM	0.185	1.496	NS	0.141	-0.019	0.390	0.181	0.124	0.124
Age -> IOKT use	0.157	1.226	NS	0.226	-0.054	0.367	0.166	0.128	0.128
inter-organizational knowledge searching -> IOKT use	0.738	4.900	***	0.000	0.489	0.986	0.735	0.151	0.151
inter-organizational knowledge sharing -> IOKT use	-0.181	1.101	NS	0.276	-0.453	0.090	-0.172	0.165	0.165
Knowledge transfer intent -> IOKT use	-0.178	0.824	NS	0.414	-0.534	0.178	-0.148	0.216	0.216
Organizational knowledge transfer culture -> IOKT use	0.289	1.524	NS	0.134	-0.024	0.602	0.278	0.190	0.190
PPP experience -> IOKT use	0.118	0.860	NS	0.394	-0.109	0.345	0.112	0.138	0.138
Partner characteristics -> IOKT use	-0.072	0.462	NS	0.646	-0.330	0.186	-0.053	0.156	0.156
Policy level -> IOKT use	0.217	1.818	*	0.075	0.020	0.413	0.212	0.119	0.119
Age -> inter-organizational knowledge searching	0.000	0.003	NS	0.997	-0.197	0.196	-0.007	0.119	0.119
Knowledge transfer intent -> inter-organizational knowledge searching	0.052	0.287	NS	0.775	-0.246	0.349	0.043	0.180	0.180

Continued

Organizational knowledge transfer culture -> inter-organizational knowledge searching	0.239	1.988	**	0.052	0.041	0.436	0.253	0.120	0.120
PPP experience -> inter-organizational knowledge searching	-0.114	0.978	NS	0.333	-0.305	0.078	-0.115	0.116	0.116
Partner characteristics -> inter-organizational knowledge searching	0.548	3.343	***	0.002	0.277	0.818	0.549	0.164	0.164
Policy level -> inter-organizational knowledge searching	-0.106	0.880	NS	0.383	-0.305	0.093	-0.105	0.121	0.121
Age -> inter-organizational knowledge sharing	0.056	0.474	NS	0.638	-0.139	0.250	0.053	0.118	0.118
Knowledge transfer intent -> inter-organizational knowledge sharing	0.286	1.726	*	0.091	0.012	0.560	0.281	0.166	0.166
Organizational knowledge transfer culture -> inter-organizational knowledge sharing	0.454	2.977	***	0.005	0.202	0.706	0.469	0.153	0.153
PPP experience -> inter-organizational knowledge sharing	0.035	0.256	NS	0.799	-0.190	0.260	0.036	0.136	0.136
Partner characteristics -> inter-organizational knowledge sharing	0.019	0.141	NS	0.889	-0.205	0.243	0.013	0.136	0.136
Policy level -> inter-organizational knowledge sharing	-0.111	0.880	NS	0.384	-0.319	0.097	-0.096	0.126	0.126
Organizational knowledge transfer culture -> Knowledge transfer intent	0.572	4.872	***	0.000	0.378	0.765	0.566	0.117	0.117

*significant at 90% confidence; **significant at 95% confidence; ***significant at 99% confidence

Annex 3. IOKTE model, total effects structural model.

Significance testing results total effects	Original sample (O)	T statistics (O /STERR)	Significance	p value	Confidence interval (90%)		(M)	(STDEV)	(STERR)
					LB	UB			
Age -> IOKT use	0.146	1.042	NS	0.303	-0.085	1.937	0.155	0.140	0.140
Interorganisationak knowledge searching -> IOKT use	0.738	4.900	***	0.000	0.489	2.539	0.735	0.151	0.151
Interorganizational knowledge sharing -> IOKT use	-0.181	1.101	NS	0.276	-0.453	1.633	-0.172	0.165	0.165
Knowledge transfer intent -> IOKT use	-0.192	0.787	NS	0.435	-0.593	1.702	-0.169	0.243	0.243
Organizational knowledge transfer culture -> IOKT use	0.273	1.257	NS	0.215	-0.085	2.141	0.280	0.217	0.217
PPP experience -> IOKT use	0.028	0.179	NS	0.859	-0.230	1.835	0.015	0.157	0.157
Partner characteristics -> IOKT use	0.329	1.711	*	0.094	0.012	2.171	0.344	0.192	0.192
Policy level -> IOKT use	0.158	1.261	NS	0.214	-0.049	1.934	0.154	0.126	0.126
Age -> IOKTE: DCM	-0.158	1.081	NS	0.285	-0.399	1.638	-0.157	0.146	0.146
IOKT use -> IOKTE: DCM	0.671	3.897	***	0.000	0.387	2.493	0.638	0.172	0.172
Interorganisationak knowledge searching -> IOKTE: DCM	0.472	2.324	**	0.024	0.137	2.325	0.468	0.203	0.203
Interorganizational knowledge sharing -> IOKTE: DCM	0.068	0.390	NS	0.698	-0.218	1.891	0.097	0.173	0.173
Knowledge transfer intent -> IOKTE: DCM	-0.076	0.412	NS	0.682	-0.378	1.758	-0.073	0.184	0.184
Organizational knowledge transfer culture -> IOKTE: DCM	0.294	1.879	*	0.066	0.036	2.100	0.279	0.156	0.156

Continued

PPP experience -> IOKTE: DCM	0.213	1.541	NS	0.130	-0.015	2.002	0.215	0.139	0.139
Partner characteristics -> IOKTE: DCM	0.211	1.256	NS	0.215	-0.066	2.030	0.224	0.168	0.168
Policy level -> IOKTE: DCM	0.088	0.858	NS	0.395	-0.081	1.840	0.074	0.102	0.102
Age -> Interorganizational knowledge sharing	0.056	0.474	NS	0.638	-0.139	1.824	0.053	0.118	0.118
Knowledge transfer intent -> Interorganizational knowledge sharing	0.286	1.726	*	0.091	0.012	2.102	0.281	0.166	0.166
Organizational knowledge transfer culture -> Interorganizational knowledge sharing	0.618	4.395	***	0.000	0.386	2.408	0.627	0.141	0.141
Policy level -> Interorganizational knowledge sharing	-0.111	0.880	NS	0.384	-0.319	1.665	-0.096	0.126	0.126
PPP experience -> Interorganizational knowledge sharing	0.035	0.256	NS	0.799	-0.190	1.821	0.036	0.136	0.136
Partner characteristics -> Interorganizational knowledge sharing	0.019	0.141	NS	0.889	-0.205	1.805	0.013	0.136	0.136
Age -> Interorganisational knowledge searching	0.000	0.003	NS	0.997	-0.197	1.769	-0.007	0.119	0.119
Knowledge transfer intent -> Interorganisational knowledge searching	0.052	0.287	NS	0.775	-0.246	1.882	0.043	0.180	0.180
Organizational knowledge transfer culture -> Interorganisational knowledge searching	0.268	1.794	*	0.079	0.022	2.068	0.275	0.149	0.149
PPP experience -> Interorganisational knowledge searching	-0.114	0.978	NS	0.333	-0.305	1.653	-0.115	0.116	0.116
Partner characteristics -> Interorganisational knowledge searching	0.548	3.343	***	0.002	0.277	2.361	0.549	0.164	0.164
Policy level -> Interorganisational knowledge searching	-0.106	0.880	NS	0.383	-0.305	1.665	-0.105	0.121	0.121
Organizational knowledge transfer culture -> Knowledge transfer intent	0.572	4.872	***	0.000	0.378	2.339	0.566	0.117	0.117

*significant at 90% confidence; **significant at 95% confidence; ***significant at 99% confidence.



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