Competences of Smart City Planners: the Alpha and Omega

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1 ABSTRACT

Revisiting previous research in the course of the DevOps project 'DevOps Competences for Smart Cities' (Kaufmann et al., 2020), this paper aims to zoom in the interrelationship between Smart City domain priorities, collaboration and competences regarded to be a paramount fundament for urban management. After a discussion of literature on this triptych, a conceptual framework is synthesized. The hypothesized conditional importance of competences is analyzedand confirmed by additional descriptive and explanatory quantitative research on the DevOps data on smart city planners having applied partial least square analysis.

Keywords: Collaboration, Planning, Competences, Smart City, DevOps

2 INTRODUCTION

Smart cities (SC) can be considered as the holy grail of modern urban management. The body of knowledge on smart cities in relation to the domain of urban management is growing from different perspectives. Currently, planning, organization and administration of transformational value increasing processes of cities and towns led to the development of innovative paradigms entailing, for example, participatory, collaborative and decentralized decision making and activating the city stakeholders, specifically its citizens (Malek, Lim and Yigitcanlar, 2021; Gafoor and Al-Wehab, 2020) facilitated by modern digital data and ICT technologies(Semyachkov and Popov, 2020).Anexus for urban management unfolds embracing three factors regarded paramount for urban management: newly required smart city competencies, planning priorities (domains) and collaboration (e.g. Allam, 2019; Appio et al., 2019; Lytras and Serban, 2020; Raspotnik et.al. 2020; Kaufmann et al., 2020).

However, recent studies have pointed to still existing gaps for this triptych to unfold smoothly. Lytras and Serban (2020), for example, recently pointed to existing shortcomings on competences and capacities of public administration personnel to promote new e-governance services and systems in smart cities. Related to priorities, Agbali et al. (2017) and Charalabidis et al. (2020) recommend future research to improve on their proposed frameworks.With regard to competences, a comprehensive typology of competences has been created, piloted and trained in MOOCs courses by the DevOps project comprising transversal competences, general IT competences, IT specific competences and idiosyncratic Smart city related competences (Kaufmann et al., 2020). The paper proposes a synthesized conceptualization on the essential triptych of competencies, collaboration and domain priorities and hypothesizes that closing the competence gap should be prioritized in comparison to 'collaboration and priorities' and should be regarded conditional for urban management.

Specific Objectives of the study:

Reviewing the literature on the interrelationship betweenSC competencies, priorities and collaboration.

To derive at explanations of the nature of the relationship between the three factors by expanding on previous findings of the DevOps project (Kaufmann et al., 2020) by additional descriptive and explanatory analysis.

To develop ahypothesized framework on the triptych to suggest avenues for future research.

3 LITERATURE REVIEW

This section is going to discussa selection offrameworks on SC and urban managementregarded as relevant in the context of this study.

3.1 The meaning of "smart"

In the urban planning context, smartness is treated as a normative claim and an ideological dimension, and being smart entails strategic directions. Governments and public agencies are embracing the notion of smartness to distinguish their strategic policies for targeting sustainable development, sound economic growth, and better quality of life for their citizens (Center on Governance, 2003). The label 'smart city', however, is a fuzzy concept and is used in ways that are not alwaysconsistent. There is neither a single template of framing a smart city nor a one-size-fits-alldefinition of a smart city (Albino et.al. 2015).

Pointing to higher levels of authenticity between claims and reality, Hollands (2008) recognized a smart city as an "urban labelling" phenomenon, and calls a smart city to back upits emphasis on the many aspects which are hiddenbehind self-declaratory attributions to this label.

Nam and Pardo (2012) review the meaning of the term 'smart' in the smart city

context. In marketing terminology, smartness is regarded to be centered on a user perspective due to the need for appeal to a broader base of community members.The association with the term 'Smart'with being user-friendlyseems to be more appropriate than the term 'intelligent' Albino et al., 2015) which is connoted with having aquick mind and being responsive to feedback. This interpretation implies that 'smartness' is realized only when the system adapts itselfto the user and citizen needs.

3.2 Smart City Models and Frameworks on priorities, collaboration and competences

Many models on smart cities' development have not revolved aroundthe nexus between thethreeissues of priorities, collaboration and competences regarded central by the authors of this paper. Their relevance has already been established in numerous studies albeit not in an integrated manner. Cukusic et al. (2019) discussed the challengesand priorities for developing smart city initiatives. This study implies a focus on collaboration (engagement and community)as well as on priorities on specific smart city domains such as economy, housing, energy, waste, water, mobility, security and health care. The main contribution of the paper is to expose the most challenging strategic factors (priorities) in the national context of a country i.e. Croatia.

Charalabidis et al. (2020) contributed to fill the knowledge gap on the level of the convergence and divergence between municipalities and citizens on smart city action priorities.Furthermore, the authors developed a novel methodology where a detailed taxonomy of possible smart cities actions (priorities) has been developed based on previous literature.

In the same vein, Agbali etal.(2017) proposed a framework consisting of domain priority issues for the smart and healthy city development which includes smart infrastructure (measured by the availability of smart grid/robust energy, secured and innovative transport system, availability of sustainable health care facilities), smart institutions (measured by an innovative and proactive security system, tourist potential, entrepreneurship), orsmart people (measured by social awareness, quality education, increased productivity). However, whilst this comprehensive study focused on priority issues it did notaddress competencies and collaboration issues in more depth.

In addition, Allam (2019), via focus group discussions, explored some priority issues for smart urban regeneration. Interestingly,comparing smart cities with an organism and its life generating reactions, the author's smart city metabolism includes social infrastructure cluster (namely sustainability and livability), business support (including public and government funds where most of its funds are spent for administrative resources to generate revenues for the retention of the business), collaboration (between public and private sector namely for encouraging business; better managing public assets and disaster management), smart infrastructure (including parking, IT connectivity and big data or any other data management system for urban planning), culture (including the need to encourage artists to perform in the public places, cultural landmarks, culture as a branding tool and the potential of cultural digital goods), governance (highlighting health care, law enforcement, targeting inclusive policies and security). In this study collaboration has been mentioned as an integral factorwithout expandingon the nexus between more detailed priorities, collaboration and competences required.The study also mentioned the need of a more comprehensive and detailed model.

Interrelating domain priorities, smart government, and characteristics of e-government with innovative factors such as market flexibility, government efficiency, and the legal system as well as institutional and structural factorsto achieve improved economic performance, a comprehensive model is provided by Lytras and Serban (2020). According to the authors of the study, "the main contribution of this study is two-fold: From one side it provides an integrated study with emphasis on the impact on social science and economics research to future smart cities research and on the other side it brings forward several soft factors for the adoption of smart city services in the context of government transformation and provision of ubiquitous e-services to citizens" (p.65313). Whilst market flexibility, government efficiency, the legal system and the characteristics of e-government imply certain competences, detailed instrumental competences are suggested to be added. Economic convergence implies collaboration without explicitly mentioning the term.

Focusing their study on one particular competence, Garg, Mittal and Sharma (2017) extensively discussed e-training and depicted a framework by means of differentantecedents like knowledge, skills, development, learning, workshop, coaching, and teaching. The authors aimed to reveal the influence of e-training on building smart citizens(by means of educating them though training), and eventually smart governance and smart business enterprise. According to the authors, "this research brief mainly concentrate of administration, people and knowledge creation for developing organization's e-training platform helping in building smart cities with digital enterprise (smart business), administration (governance) and people or smart citizens. The paper tries to put forward the concept and designing of e-learning platform to provide instant training and education for shaping the new generation citizen" (p. 24).Thus, it can be noted that this paper has tried to 'marry'smart city competences and specificsmart city priorities albeit limited to e-training.

Raspotnik, Gronning and Herrmann (2020) measured the effectiveness of three different arctic cities in three countries (United States, Norway and Finland) in terms of smart city priorities which are smart people, smart energy, smart environment, smart mobility, and smart governance. The main contribution of the paper is to develop a metrics for smart city development. To do this the authors have first surveyed smart city literature and develop smartness metrics based on smart city priorities which the authors named "smart framework". Thus, the paper has also only focused on a single dimension of the suggested nexus in terms of smart city priorities.

Umar (2018) proposed an extensive research framework on smart collaboration.According to the authors, "the paper contributes in presenting an alternative perspective that is based on smart collaborating hubs and a smart global village to serve smaller communities. As can be observed these hubs provide inexpensive and highly specialized services in health, education, public safety, public welfare, and other vital sectors for the underserved populations across the globe" (p.1) .This paper is a bright example of an extensive model of smart city collaboration between entities utilizing smart competencies. The paper is suggested to expand in more detail on the constructs of other more detailed and comprehensive smart city priorities and on transferring required competences.

Concentrating on a specific type of collaboration, Canels etal. (2017) call for public-private collaborations for transforming urban mobility. In their study they suggest this collaboration for new mobility services based on four categories: shared mobility, product innovation, consumer experience and data driven decision making. Further priorities and requested competencies are suggested to be researched in future as well.

Ojasalo and Kauppinen (2016) conducted a significant study on collaborationin terms of open innovation platforms for smart cities. The study focused on collaborative innovation highlighting unforeseeable innovation potential, open data innovations, and sustainable solutions through long-term innovative partnerships.In the following, the authors, summarize the main contribution of the paper: "despite the rapid increase of public–private–people partnership (PPPP) programs at the global scale, the scientific knowledge of collaborative innovation in cities is scarce. All smart city initiatives emphasize collaborative innovation for better services and products to address the needs and problems of modern cities. Indeed, there is an evident need for both scientific and practical knowledge in this area. Based on an extensive empirical study of open innovation platforms in smart cities, this article seeks to address this knowledge gap by increasing the knowledge of opportunities and challenges of collaborative innovation between a city and external actors, including companies, third sector organizations, research institutions, and citizens" (p.49). The paper confirms the collaboration gap and focuses on competences in terms of innovation.

In general terms, Appio et al. (2019) developed a framework coming closest to the main theme and call of this paper in terms of integrating priorities, collaboration and competences. The driving factor is the envisioned increase of the citizens quality of life (dividing social life in live/play and learn/work) achieved by a fundamental physical infrastructure and by collaborative and innovative SC ecosystems addressing Griffinger's (in Appio et al., 2019) six SC domain priorities. Competences are generally referred to within the domain of Smart people and its sub-component of human capital comprising skills and competences. The framework entails factors in line with Allam's (2019) SC priorities metabolism and is suggested to be used as a 'guiding model' for future qualitative or quantitative research.

Summarizing, from the prior recent literature, it is concluded that there is almost no study that has developed a detailed model to establish the nexus between the three integral smart city elements serving as a basis to train SC administrators and related stakeholders. Revisiting our previous paper (Kaufmann et al., 2020), this study is attempting to fill this gap in the literature by proposing a synthesized integrated framework (figure 1) suggested to be the quintessential triptych of urban management, also aiming to inspire further conceptual developments.

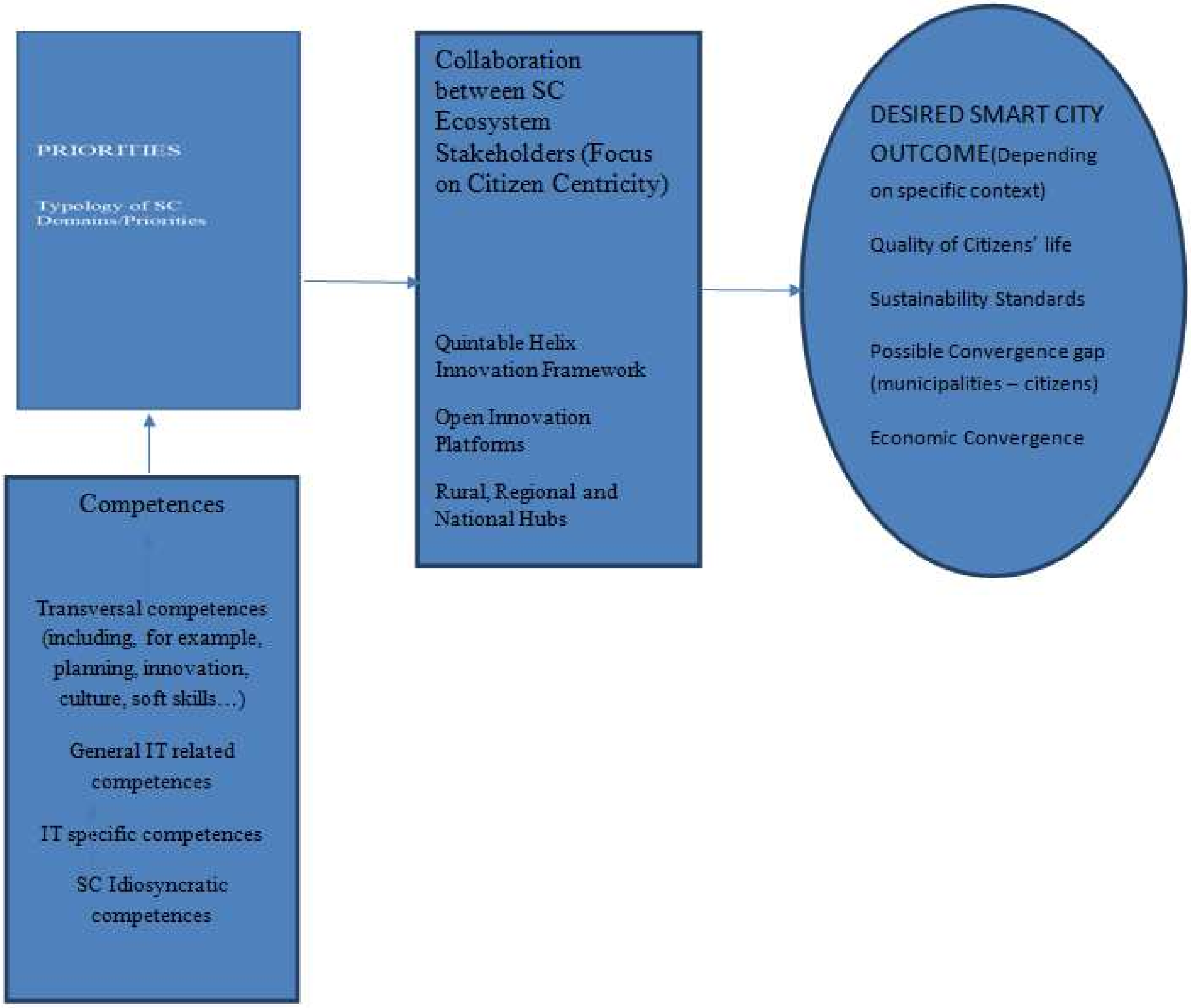

Figure 1: Proposed Integrated Framework. Source: developed from the authors based on Agbali et al. (2017) Allam (2019), Appio et al. (2019), Charalabidis et al. (2020),Cukusic et al. (2019),Garg, Mittal and Sharma (2017), Kaufmann et al. (2020), Lytras and Serban (2020), Ojasalo and Kauppinen (2016), Umar (2018)

4 METHODOLOGY

With regard to priorities, collaboration and competences, the DevOps project – based on an extensive secondary research, initial descriptive quantitative research and a consecutive validating qualitative empirical phase (Kaufmann et al., 2020) revealed a comprehensive typology of competences differentiated for three different levels of smart city administrators: Smart City Planners, IT Managers/CDOs and IT Officers. This study additionally pointed to interrelationships with the other elements of the suggested nexus: priorities and collaboration. In the progress of the DevOps project, the competence typology served as a basis for the design of innovative MOOCS courses on DevOps competences for Smart City administrators and other SC ecosystem stakeholders. The MOOCs courses were piloted and implemented in the partner countries of the project members. For more information on the MOOCs courses, please, go to the following website: https://all-digital.org/smart-devops-specialisation-courses-under-way/

This paper adds additional explanatory findings – based on the previous study- having applied partial least square analysis to investigate the nature of the relationships on the tripartite.

4.1 Data generation & sampling

From received 63 questionnaires of smart city planners across the DevOps partner countries (Kaufmann et al., 2020), the non-probability sample needed to be reduced to 60 due to three questionnaires not being usable because of missing data. Notwithstanding considerable efforts undertaken by the researchers, the sample size could not be increased for several reasons. Therefore, later stages of the project shifted the emphasis on validating the quantitative research by qualitative research.

4.2 Descriptive statistics

Focusing first on IT/IoT competences, the analysis uncovered the top three ones which are needed from the perspective of smart city planners: Teamwork (36 participants mentioned this aspect), urban innovation (32) and user experience (28), while the top three for chief digital officers/internal IT officers – perceived from SC planners- are big data management (36), system operation skills such as database and network administration, coding as well as software architecture (32).

However, the highest perceived training demands are expected to be in IoT specific knowledge (31), DevOps (integrating software development and operations, 28) and machine learning as well as deep learning (27). Moreover, there is a will to co-operate with external partners for the acquisition of the following top three competences: mobile development (35), IT/cyber security as well as artificial intelligence (32 for both competences). The average of 20.4 participants perceive a training demand (M = 21.0, SD = 5.0) for a specific competence while co-operation with external partners is preferred from 25.8 participants on average (M = 25.0, SD = 4.2). Interestingly, the competences in which training is mostly needed do not overlap with those competences which are chosen for co-operation. Therefore, we conclude that these competences are rated as very important, so that these should be trained and be existentin-house instead of relying on external competences.Appendix 1 provides an overview of all results.

The participants were also asked to rate in which transversal/generic competences they perceive a need for training or co-operation. Appendix 2 summarizes these results. The overall conclusion is that in all dimensions the competences with the highest needs for training among smart city planners differ from those where external experience (e.g. consultants, IT experts) is often mentioned to be required. So, if there is a high need in training, smart city planners with regard to a certain competence (e.g. technical skills to switch from operational to strategic tasks, 34), then external co-operation is selected less frequently (here: 22). In this regard, we again conclude that smart city planners do need trainings in certain competences in order to generate own additional human capital.

However, external knowledge is also required, especially in those competences in which fewer demands for training have been identified. On average 24.2 participants (M = 25.0, SD = 4.2) perceive a need for training for smart city planners, and on average 21.9 participants (M = 22.0, SD = 4.1) perceive a need for training for chief digital officers/IT officers, while on average 17.4 participants (M = 17.0, SD = 4.0) perceive a need for external knowledge.

Beyond our analysis on highlighting the importance of trainings, we also provide insights on the preferences of the sample on how employees should be trained. As to the preferred option of knowledge transfer, 28 respondents intend to train employees via consultants and 27 via online and distance learning (i.e. massive open online courses (MOOCs)). Moreover, under- and/or postgraduate courses as well as professional training/vocational courses at a university, courses from professional training providers or software producing companies are chosen from 11 to 16 participants, while only six participants prefer another kind of training (appendix 3).

4.3 Results of Partial Least Squares Structural Equation Modelling Analysis

PLS-SEM (partial least squares structural equation modelling) was used for analyzing the generated data, as it enables researchers to predict and to make use of small sample sizes (Hair et al., 2017a; Hair et al., 2017b).

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Moreover, PLS-SEM is being used widely across business research (Sarstedt, 2019). In this research project, it was the overall aim to understand relationships, instead of achieving the best fit between data and a model, as it would be in covariance-based Structured Equation Modelling (CB-SEM) (Hair et al., 2017a). The SmartPLS version 3.2.8 was applied in this data analysis (Ringle et al., 2015) which is the most extensive software (Henseler, 2017).

Regarding the sample size, we followed the rule of ten, so that a minimum sample size for this analysis of 60 questionnaires (normally distributed data is not required when applying PLS-SEM) was necessary(Hair et al., 2017a).

Since all the constructs are formative measures, we tested the collinearity issues using the variance inflation factor (VIF), which should be below 5 (Hair et al., 2017a).

In order to assess the structural model, goodness-of-fit indexes should not be used in PLS-SEM (Henseler and Sarstedt, 2013), but the VIF was used again (Hair et al., 2017; Sarstedt et al., 2017) and led to results between 1.000 and 1.617, so no issues of multi-collinearity have to be reported in the structural model. In addition, the R^2 values have been analyzed for the endogenous variables as they are a mean for the in-sample prediction/predictive accuracy (Sarstedt and Cheah, 2019; Hair et al., 2017a; Hair et al., 2017b). R^2 values for endogenous latent variables within the structural model are described as substantial (0.67), moderate (0.33) and weak (0.19) (Henseler et al., 2009; Chin, 1998). Moreover, we analyzed the f^2, meaning the effect size, in order to identify if an effect is meaningful (Hair et al., 2017a) by following Cohen's (1988) differentiation between small, medium or large effects (0.02, 0.15, 0.35).

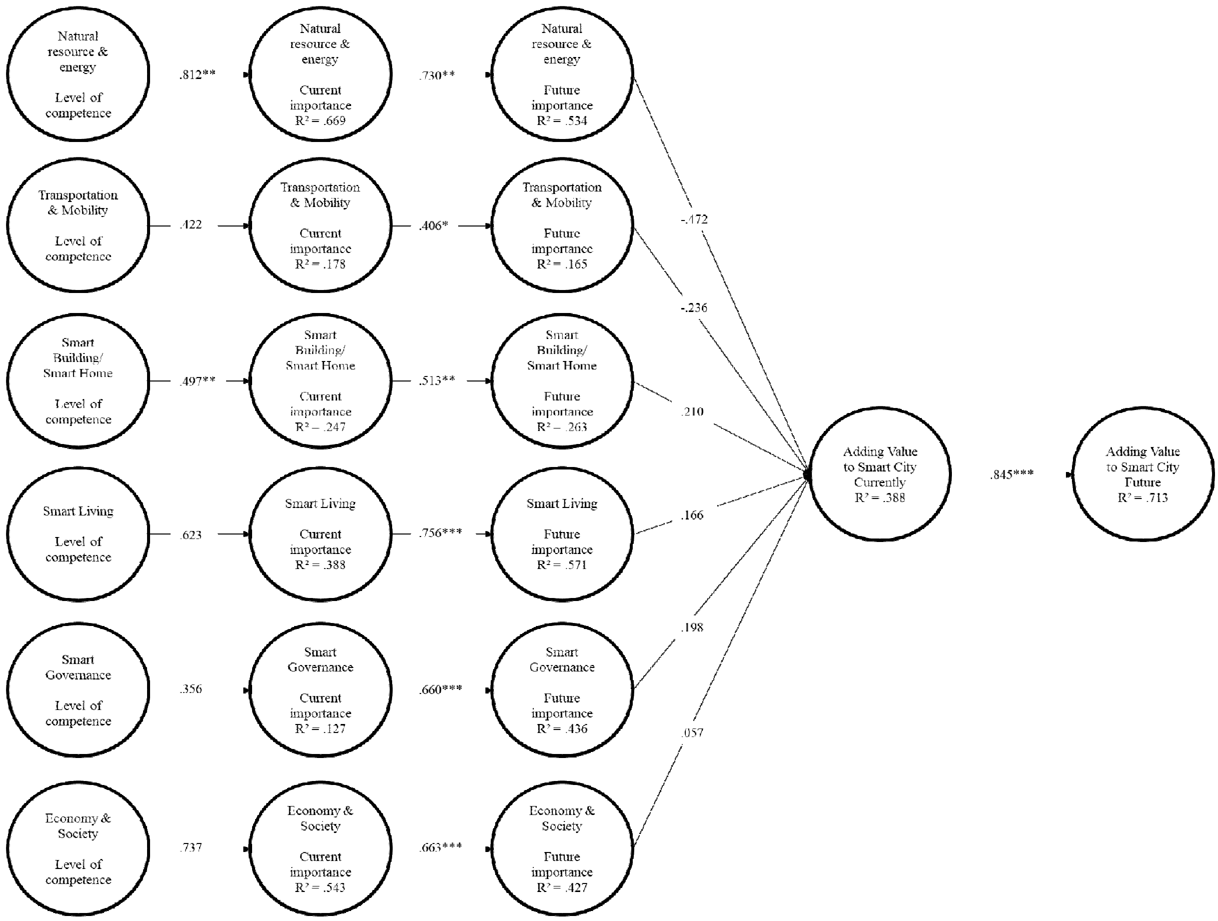

Figure 2: Relationships between level of competence and current and future importance of domain priorities. Note: * < .05, ** < .01, *** < .001

Figure 2 visualizes that one third of the relationships between level of competence and current importance are significant and positive whilst two third are not significant but also positive. This indicates that an increase of competences leads to a higher current importance of every subdomain, presumably because the participants can either assess the relevance as they are competent enough to do so, or because they consider it important as they are competent in this field.

Moreover, all relationships between current and future importance of each subdomain are significant and positive. The explained variance in the constructs applying for future importance differs from a weak R^2 = .165 (transportation & mobility, which also has the lowest p-value) and moderate R^2 = .571 (smart living). In general, as all of these relationships are significant and positive, indicating that a higher current importance of each subdomain of smart cities leads to a high importance of smart city subdomains in future. In addition, the relationship between the adding value to smart cities in current and in future is also positive and significant (β = .845, $p < .001$) and .713 of the variance is explained (substantial). The findings based on the positive and significant relationships between the subdomains current and future importance as well as the positive and significant relationship between adding value to smart cities in current and in future underlines the authors' understanding that the existence and relevance of smart cities including their subdomains is not only a short-term trend, but an important aspect for the cities' future. Therefore, the competence level of each subdomain should be as high as possible among the relevant groups of people (here: smart city planners).

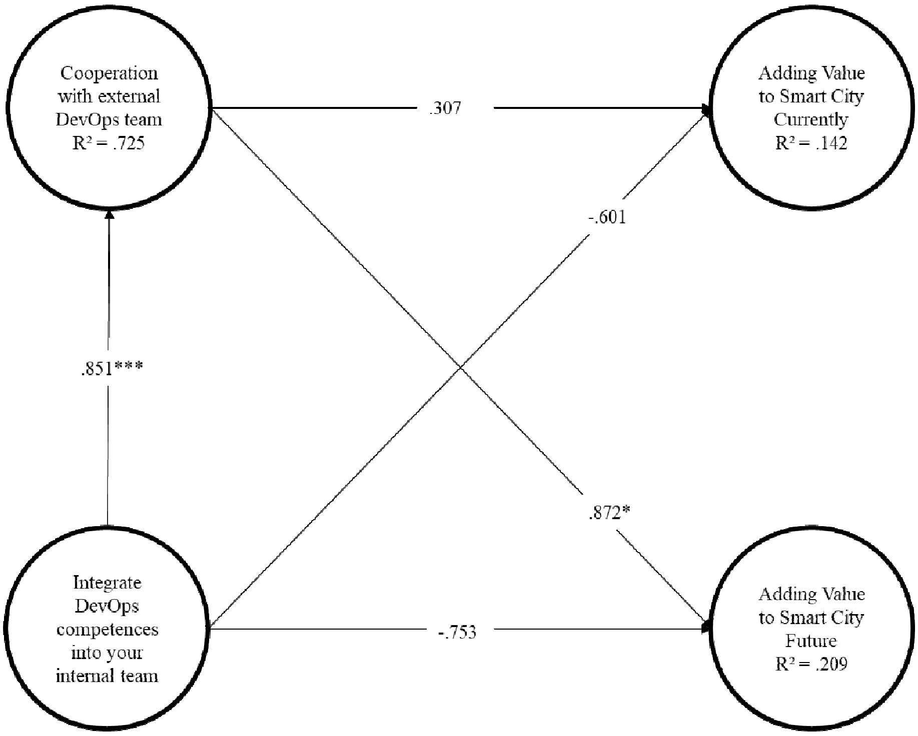

Figure 3: Results of structural equation modelling, own depiction. Note: * < .05, ** < .01, *** < .001

The results of the PLS-SEM provide two significant relationships. If companies are integrating more DevOps competences into their internal team, the cooperation with external DevOps teams is more likely (β = .851, $p < .001$). This also explains .725 of the variance of the target construct, which is classified as substantial (cf. Henseler et al., 2009; Chin, 1998). This relationship indicates that a certain degree of DevOps competences is necessary as a starting point, leading to an inclusion of external competences through co-operation.

Moreover, the relationship between cooperation with external DevOps teams and adding value to smart cities in future is also positive and significant (β = .872, $p < .1$), but explaining the variance of the endogenous construct (R^2 = .209) weakly. This relationship highlights, that the adding value increases, in times companies co-operate with external DevOps teams. This indicates that working together with different teams raises the adding value. The other relationships are not significant, but their path-coefficient indicate the strength and direction of each depicted relationship.

5 CONCLUSIONS

Related to the 'triptych model' (nexus between competences- priorities- collaboration), the research confirms the existence and training of competences to be conditional for priority setting and requested collaboration with external partners. Suggestions for future research refer to considerably increase the sample size and replicate the quantitative research by detailed operationalization and investigating possibly existing moderating or mediating effects of the variables in the synthesized framework (figure 1). With emphasizing competences and its relationship to priorities and collaboration, the DevOps project put a good foundation for more detailed conceptual work. The findings reflect that smart city planners perceive and do need trainings in certain competences in order to generate own additional and sustainable human capital. Competences regarded as most important should be trained and existing in-house instead of outsourcing these competences externally. An increase of competences lead to a higher current and future importance of every priority subdomain. On the other hand, if SC administrations are integrating ever more DevOps competences into their internal team, the co-operation with external DevOps teams is more likely leading to a perceived adding value increase.

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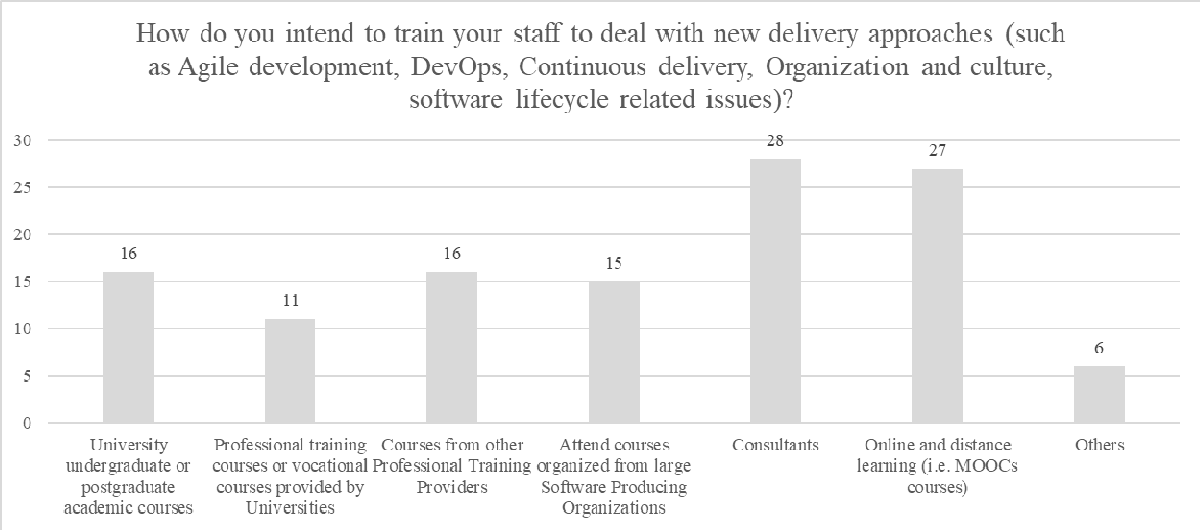
8 APPENDIX

Competence	Smart City Planner	Chief Digital Officer/Internal IT Officer	Co-operation with External IT experts, consulting service provider, Universities	Training demand
Teamwork	36	26	22	20
Urban innovation	32	21	22	26
User experience	28	20	21	20
Agility approaches	23	22	24	24
Business analysis & intelligence	23	19	22	21
Quality assurance	22	19	29	21
System operation skills such as database and network administration	20	32	24	21
Coding	20	32	20	15
IT and cyber security	19	29	32	23
Platform developer	19	20	31	17
IoT specific knowledge	19	18	29	31
Networks	19	30	28	19
IT product design, product discovery and management	19	17	26	17
Big data management	19	36	25	23
Artificial intelligence	18	12	32	23
Continuous integration	18	29	31	0
Vertical system integration	18	26	25	23
Business transformation	18	21	23	23
Simulation	18	20	18	17
Data science and advanced data analytics	17	26	22	25
Testing	17	26	19	19
Website management	16	21	29	15
Device management support	16	27	24	22
Spatial data infrastructure	15	22	27	22
Additive manufacturing and 3D print	15	14	27	21
DevOps (integrating software development and operations)	15	20	19	28
Mobile development	14	17	35	20
Software architecture	14	32	29	17
Machine learning and deep learning	14	14	26	27
Augmented reality	14	15	25	22
Cloud computing	13	26	31	21
Microservices	13	19	25	17
Continuous delivery	13	22	20	14
Hardware interfacing	12	18	29	20
Automation	12	18	27	20
Multi agent systems	9	12	30	22
Autonomous robots	9	14	25	17
Average	*17.7*	*21.9*	*25.8*	*20.4*
Mean	*18.0*	*21.0*	*25.0*	*21.0*
Standard deviation	*5.5*	*6.0*	*4.2*	*5.0*

Appendix 1: Which IT/IoT related competences do you require in your SC planning role (Smart City Planner); which competences do you see required for Chief Digital Officers and internal IT Officers, and as to which competences do you prefer to co-operate with external partners? Where do you perceive training demand?

Dimension	Competence	Smart City Planner	Chief Digital Officer/IT Officer	Required from External IT experts, Consulting service provider, University
General technical competences	Technical skills to switch from operational to strategic tasks	34	23	22
	Broad and deep process understanding due to higher process complexity	31	26	19
	Creativity	28	16	21
	Technical skills to evaluate and apply the integration between geospatial tech and traditional IC tech & engineering processes	24	34	19
	Media skills (i.e. smart media, i.e. smart glasses)	21	25	19
	Rudimentary understanding of technology (data analytics, the ability to leverage and communicate that know-how)	20	22	22
	IT, Media or IoT-specific skill	17	27	20
	Familiarity with ICT hybrid media literacy	17	22	26
	IoT architect or an IoT security specialist	17	27	24
	IoT supportive skill	15	27	26
	Understanding IT security	14	31	23
	Combination of existing skills that are augmented to some degree with IoT expertise	13	27	25
Methodological competences	Design thinking	28	20	17
	Efficiency orientation	26	26	18
	Conflict solving	25	21	19
	Research skills and continuous learning	25	20	26
	Entrepreneurial thinking (corporate entrepreneurship; social entrepreneurship)	24	19	22
	Problem solving	24	22	16
	Decision making	24	21	16
	Analytical skills	24	22	17
	To be able to co-operate in ad-hoc fashion (to take individual or socially constructed ideas into action)	22	19	19
Social competences	Create relationships	30	28	15
	Ability to merge different skills	30	22	14
	Being co-operative	29	22	14
	Resilience	29	24	19
	Ability to work in a team	28	28	17
	Social skill	28	21	12
	Intercultural skills	27	17	20
	Diversity Management	27	13	14
	Ability to transfer knowledge (explicit and tacit)	26	20	17
	Language skills	25	24	27
	Networking skills	25	28	17
	Ability to be compromising	25	22	16
	Action-related competencies	24	16	12
	Communication skills (including virtual communication skills)	24	23	16
	Past professional experiences	23	22	17
Personal competences	Sustainable mindset	30	17	18
	Strategic vision	28	21	15
	Open-mind behaviours	27	24	13
	Project and process management	27	19	12
	Compliance	26	25	16
	Leadership skills (every employee becoming a leader)	25	24	15
	Flexibility	25	25	14
	Ambiguity tolerance	25	12	16
	Spatial thinking	25	17	16
	Emotional intelligence	25	23	12
	Ability to work under pressure	24	24	15
	The ability to mediate conflicts	24	21	15
	Motivation to learn	23	24	20
	Attitudes, communication	23	21	12
	Reflective	22	18	14
	Leadership capacity	22	21	10
	Empathy	21	20	11
	Output oriented	21	18	15
	Autonomous	19	24	11
Legal compe-tences	Legal aspects of public procurement	23	20	17
	Contractual issues involved in public-private partnerships	21	18	20
	Legal notions regarding big data/open data management	20	22	15
	Data security	19	23	21
City Planning cap-abilities	Territorial planning	31	18	18
	Management of urban facilities	27	20	17
	Urban innovation	26	16	21
Civili-zational compe-tences	Engaging citizens	24	17	17
Average		*24.2*	*21.9*	*17.4*
Mean		*25.0*	*22.0*	*17.0*
Standard deviation		*4.2*	*4.1*	*4.0*

Appendix 2: In which of the following transversal/generic competences do you perceive training or co-operation needs?



Appendix 3: Intention to train staff

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