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Measuring the value and the role of soft assets in smart city development

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ABSTRACT

The global trend in urban planning is moving towards smart city (SC) development. This involves a combination of smart infrastructure, innovative technologies and the use of 'soft assets' to create more effective integration of the changes within each urban community. This paper outlines and analyses a framework to measure soft assets in SC implementation to assist policy discussions in urban development. The different approaches to identifying and measuring intangible or soft assets by leading researchers, practitioners, and public organizations are reviewed and evaluated. Fundamentally, intangible/soft assets are unique, and context-dependent by nature. They are powerful assets creating value and are connected to other assets to yield outcomes and impact according to alignment to SC objectives. Reviewing several approaches to measurement clearly indicates that the way intangible/soft assets are addressed differ according to different frameworks used, including the accounting framework, strength of management control, and using the assets as an integral part of knowledge management. These tools make it possible to identify, measure and understand the roles of soft assets and explain how they are intricately linked at multi-dimensional and multi-tier levels of urban development. Effective use of soft assets greatly strengthens the ability of a city administration or Local Government Unit (LGU) to provide innovative solutions and create value if the assets are optimized and aligned with the SC development goals. The value creation framework is also changed and adapted accordingly. Thus understanding SC effectiveness is increased by properly defining and providing an evaluation framework for soft assets which in turn assists policy makers and LGU administration make SCs more sustainable.

1. Introduction

In recent years, city development has intensively focused on a model of sustainable and balanced-growth. The objective is to create an economically viable, socially inclusive and sustainable environment to provide citizens or residents with a better a quality of life. The provision of effective and efficient public services is key for successful city development and management, due to increasingly rapid urbanization. Today, 54% of global population live in cities and this will increase 1.5 times by 2045 to 6 million. This means 2 more billion people will be added worldwide as urban residents (World Bank, 2016). A consequence is that global cities will face more strain on their resources, increased risks, uncertainties and damage from climate change and other external factors.

The sustainable growth model, however, has certain contradictions. It aims to achieve socio-economic growth and well-being by using natural resources and services for development in a sustainable manner, enabling future generations to be able to meet their resource needs. So to manage more inputs (i.e. people, services, resources, data, etc.) for less wasteful, ineffective, and inefficient use of resources in a smarter way, information and communications technologies (ICT) linked to hard infrastructure is being deployed widely for city development. However, the concept of an optimal "smart city" has no common definition in research or practice. The World Development Report (World Bank, 2016) definition 'a city that leverages the latest in technology and connectivity to make better decisions and achieve the urban aspirations of its residents.' Today smart technology-linked hard infrastructure (referred to in this paper as 'hard infrastructure[1]) is introduced by the government through community mobilization and applied to enhance the daily lives of citizens. There are numerous studies and analyses on how SCs are effectively operated using technology and hard infrastructure. A SC needs to distribute limited resources in an effective way and the use of innovative technology and smart infrastructure is indispensable. Smart solutions contribute to making people's life more convenient. An exclusive focus on hard infrastructure and technology risks ignoring the most critical element - community integration to ensure the welfare and well-being of citizens. In Smart transport for example, collecting and translating large amounts of data are utilized to

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[1] 'Hard infrastructure' means ICT-integrated physical infrastructure since today, most of physical infrastructure are linked to technology

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improve city traffic operations such as mobile-based ITS solutions including provision of real-time data for public transport services and assuring public security in Japan. In smart solid waste management, the Internet of Things (IoTs) enables tracking waste in South Korea using radio frequency identification to locate and track containers, identify waste, and verify services. In smart renewable energy, mini-grid renewable energy in Sri Lanka, village hydro helps the provision of electricity and socioeconomic improvements in rural areas through PV, hydro, wind, and biomass renewable energy technologies. In smart water management, smart sensor for drinking water is used for efficient water management in Mexico, there are a few examples among many other areas where smart technology provides significant benefits.

At the same time, there are increasing concerns that this type of hard infrastructure-focused development could omit a primary objective of SC development, which seeks to put citizens first, not last. First, this is because hard infrastructure comprises 'tangible (physical) assets' where investment returns are easily measurable. However, hard assets alone cannot deliver optimal "people-centered" services without human/institutional and other non-physical assets. Second, new gimmicky technologies are an easy investment choice for LGUs or other SC project developers. However, hard infrastructure is not always appropriate to many city contexts due to different development objectives, strategies, and resource constraints, including capacity gaps for planning, managing, operating, and improving city performance.

Quality infrastructure is critical for sustainable city development. With accelerating population growth and overcrowding, urban communities have demanded from LGUs improved efficiency from brick and mortar (hard) infrastructure and basic services. Equally important, citizens expect from LGUs delivery of less visible or intangible benefits, broadly called "intangible or soft[2]" assets. Smart cities globally increasingly incorporate more soft assets into city planning to improve sustainability, growth, livability and well-being of their citizens through innovative solutions. There are also examples where cities can improve living environments without depending on high-end technologies or newly fashionable hard infrastructure. One example is Amsterdam, where the city has incorporated climate proof infrastructure by prioritizing non-motorized and public transport, permeable green paving and park and recreational space offering additional benefits for water drainage and improving air quality. Another example is Paris, where old buildings have been converted for multi-purpose use such as providing office space for social enterprises, sharing workplaces, or using public space for both residents and tourists. All of these facilities aim to make a city more livable and a human place for citizens. Hard infrastructure and technologies are embedded in the social fabric and used to improve human interactions, bring citizens together, solving problems, and reducing barriers to access resources. The best example of SC development needs both hard and non-physical (soft) assets and in some cases, a SC may not always need to be technically 'smart' and can rely on lower levels of technology. Investment in soft assets is increasingly important in building strong institutional capacity and projects that value citizen well-being and thus enhance the impact of hard infrastructure and technology.

More than twenty years ago, a World Bank president announced a new vision for a "Knowledge Bank", using knowledge as a driving force to help developing countries build development capacity. From traditional banking business - offering a package of concessional lending/investment in hard infrastructure and policy recommendations to developing countries - to knowledge-bank solutions emphasizing knowledge or soft assets as powerful tools for achieving desired development. Now the knowledge-bank idea is widely accepted and implemented by many other International Financial Institutions. One of the challenges is, not surprisingly, how to evaluate such knowledge and soft assets. A one excellent example is "The development of the knowledge bank and the goal of encouraging indigenous knowledge are hampered by pressures to show a tangible result" (Cohen & Laporte, 2004). It was a major challenge for the World Bank to justify investment in intangible assets and knowledge products to increase the quality and quantity of development outcomes. This is a challenge as well for others such as national, local government, or other type of entities to show clear evidence that investment in soft assets creates positive outcomes and impact on their beneficiaries.

A study on Eurasian countries highlighted the challenges. They succeeded in natural resources management but failed through weak institutions in delivering effective public services, education and other key service areas with severe impacts on productivity and growth. This is because the Eurasian countries focused on extracting and depleting natural resources rather than improving efficiency of public investment and prioritizing intangible assets. To develop further, they badly needed invest in intangible assets. (p.p. 319–340, Gill et al., 2014).

Since 1980, developing methods to measure soft assets has been an important topic to accurately capture the growth of business activities. Technology development created a paradigm shift in business investment. Focusing on the importance of intangible assets has gained more attention due to the changing business environment and increasing attention to the knowledge-economy. In public sector context, LGUs invariably give a lower priority to soft assets than hard assets as their direct influence on outputs, outcomes, and performance are more difficult to measure than hard infrastructure investment. Learning from past SC development, it is known that hard assets by themselves do not lead to a level of sustainability essential for long-term city development. Intangible or soft assets have context specific values and yield outcomes and impact through being connected and influenced by other hand assets in the process - causality, spillover effects, interrelation - functioning both at multiple and multi-tier levels of urban development. The key question is how can soft assets receive greater priority and investment to more effectively to improve SC performance? Establishing a value creation system will contribute to long-term resilient and sustainable city growth. If there is a linkage between strengthening soft assets and creating innovative values that improves city performance, what value creation process could be considered appropriate in the SC development context? This leads to the next question: what are the best possible ways of measuring and evaluating their outcomes and impact?

This paper will briefly review and examine the role of soft assets and the benefits of framework for value creation in SC development. First different approaches to managing and measuring soft assets will be reviewed also their application to the public sector, *including defining Intangible assets and outlining different tools for measuring their performance*. Second, a "Citizens' orientation" value creation approach and classification of soft assets will be reviewed. Third, this paper will assess and analyze an approach where soft assets are measured by a "co-value creation flow" where outcome and impacts are generated by both the LUG and the citizens or community.

2. Overview of approaches to define intangible assets

There are several variations of the term "intangibles", i.e. intangibles, intangible assets, intangible capital, intellectual assets, or even soft assets as opposed to hard assets. The term intangible or intangible assets is very closely associated with accounting usage, organizational research or researcher. The background to using various terminologies represented an attempt to develop a new model of economic growth incorporating technological development, as well as the emergence of new asset definitions such as knowledge, collaboration and information. Intangible assets gained increasing attention in the

[2] In this paper, the term 'soft assets' is used instead of 'intangible assets' except the reference papers use the original term ('intangible'). By use of the term 'soft assets', it avoids focusing on monetary values as well as shows a comparison between 'soft' assets (non-physical infrastructure) and 'hard' assets (physical infrastructure).

late 90's when information technologies began to augment economic activities resulting in productivity gains. The magnitude of the change established that long-term expenditure influenced positive economic growth (Miyakawa & Kim, 2010) in business activities. Also researchers, policy makers and practitioners concentrated around areas such as accounting, business strategy and management, investment. Intangible assets can generally be explained as non-physical but identifiable assets. Some assets can be identified directly and valued, but some assets are intricately linked and difficult to distinguish and quantify. Often there is no clear definition and classification and their values depend on the specific entity or contexts. Thus the concept of intangible assets has become much broader, their values recognized as invisible assets not only in business accounting for firms or related to an entity's productivity but also in key ways to managing challenging urban development issues. In sustainable city development, innovative approaches are being sought to find better and smarter solutions and create value using soft asset approach.

2.1. Various definitions, classifications, and measurement approaches of intangible assets

In the past, there has been considerable research incorporating different perspectives/objectives on the classifications and measurement of intangible assets. Originally as the need to measure intangibles evolved, Kaplan presented four “core competencies” for intangible investment items (i.e. R&D, software, training and marketing) (Young, 1998), which were extremely influential on later studies in this area. Appendix A lists several definitions and components of intangible assets. Broadly, there are two approaches. One is to capitalize intangible assets and treat the result as a contribution to GDP. In addition to Kaplan (1987), Corrado, Hulten and Sichel (CHS Guimón, 2009) also try to measure intangible capitals by formalizing how intangibles may be incorporated into the national accounting framework. The other is value-based approach being used as a firm's performance management tool. There are different frameworks and in this paper, some of the Scorecard type frameworks and Report focused frameworks are briefly explained as they have multidimensional aspects that are useful to identify and intangible assets.

2.2. Scorecard type framework

Kaplan & Norton's core components of intangibles are designed for organizational resources management, such as People, Technology, and Organizational Climate. Their well-known *Balanced scorecard (BSC)* measures management performance with multiple perspectives that are combination of finance and non-finance perspectives to gauge the balance. (Here, “*Financial” means the firm*'s outcome measures for success and supplements the metrics of “*Customer”, “Internal Process” and “Learning and Growth* to respond to long term shareholder value) (Kaplan, 2010) The idea is how to facilitate and promote communication on strategy among the various parties. The value of intangible assets is derived from how well they align with the strategic priorities of the enterprise. (Kaplan & Norton, 2004) Here the level of contributions of intangibles to the firm's strategic objectives is measured rather than the costs Fig. 1 (a).

BSC was developed specifically for private sector but there are many attempts to apply it to the public sector. Such attempts are briefly reviewed and examined later in this paper.

One of the models derived from BSC is *Skandina Intellectual Capital Navigator*. The Skandia Navigator used by the firm (Skandia) explains that intellectual capital provides an effective instrument to manage and grow the company, as well help strengthen its range of competencies. It shows a relationship among various capital and all competencies are directly and indirectly linked Fig. 1 (b). The set of competencies is similar to those of BSC but the difference is that the aim of the Skandia navigator is to measure the organization's intellectual capital. The areas of focus (competencies or perspectives) are Finance, Process, Renewal & Development, and Customer, and Human. Each has a number of indicators categorized are largely represented in monetary terms (Lonnqvist, 2004).

On the knowledge-focused approaches, Sveiby defines that intangible assets should be explained in the context of a knowledge organization and they are described as “invisible capital”. With the idea that people are the only true agents in business (Sveiby, 1997), he stressed that people create intangible relations and tangible products by actions and continued efforts internally and externally. This contradicts the financial measurement approach which is only used to assess fiscal efficiency and shows the need to have alternative indicators beyond monetary ones. *Intangible assets monitor* is a method to measure an organization's intangible assets by presenting the three types of standards/indicators including “Growth/Renewal” (which indicate performance in areas of growth), “Efficiency” (of the organization in general); and “Stability” (the degree to which an organization can sustain its performance in a certain area is its stability/risk standard) applied to three forms of intellectual capital. (Sveiby, 2001) (Table 1).

To gain more accurate information on value creation, Lev's *value Chain Scoreboard* approach provides a comprehensive system to evaluate the process of intellectual capital creation that is divided into three steps (value chain/process of innovation) i.e. Discovery and learning; Implementation; and Commercialization (Fig. 2). Each step consists of three different ‘information boxes’ that are a broad cross section of economic sector and technologies respectively to fulfill each of nine process. By doing so, measurement criteria within these processes aim to provide an objective result. Evaluation criteria focus on quantitative aspects including i) quantitative (qualitative can be supporting information to quantitative aspect); ii) standardized (for easily comparing across firms); and iii) Empirically lined to value (Lev, 2001).

2.3. Key learning from different models

Different frameworks underlie the different approaches and methods of organizational resources management. Some can be extrapolated to the public sector and applied to national or local governments that are working on SC development. Among others, the following areas can be applied to difficult SC development initiatives.

First, private firms assign more value on investing in soft assets to develop and nurture the organization. This could not be done without clear objectives and strategies including what they want to achieve. Second, the organizational resources management system in firms' soft assets is designed for effectiveness of client service delivery through their products or services, or other forms that benefit clients. Third, although effective and efficient services (or provision of solutions for clients) add firm's value, this aspect is closely linked to strengthening a firm's human capital and accumulated technical and operational knowledge. Therefore, the firm's products or services themselves are not objectives but rather tools or ways to satisfy a firm's business model. Fourth, achieving such desired outcomes cannot be achieved in a silo working environment. A process that aims to fulfill different areas of expertise/functions requires broad cross-sectional collaboration to provide objective results. Such efforts encourage scaling-up the activities to meet higher outcomes. Lastly, open communications across the different and similar levels of staff in a firm are important. This facilitates an open environment with a balanced top-down and bottom-up culture. The process of creating values needs involvement of all levels of stakeholders in an iterative process.

2.4. Applying a value creation framework to public sector SC development

In the previous section, the various management tools for the private sector were reviewed. Those tools not only help firms better measure management performance but also identify and understand what soft assets are required for specific contexts. This method can

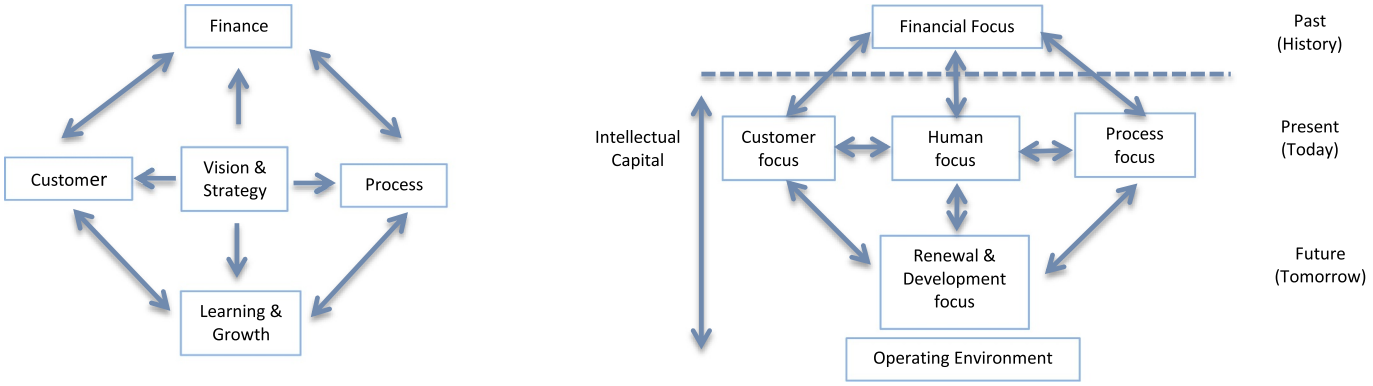

Fig. 1. (a): Value creation framework (Kaplan & Norton, 2004) (Left); (b): Navigator measurement framework (Edvinsson & Malone, 1997) (Right).

Table 1
Intangible assets monitor (Sveiby, 1997).

The intangible assets monitor		
External structure	Internal structure	Competence
Indicators of growth/ renewal	Indicators of growth/ renewal	Indicators of growth/ renewal
Indicators of efficiency	Indicators of efficiency	Indicators of efficiency
Indicators of stability	Indicators of stability	Indicators of stability

equally be applied to the public sector. Using the BSC value creation framework, this section briefly reviews the model and examines how it can be applied to SC development. For SC, LGU including public organizations has to make deliberate choices on policy and strategies to deliver optimal services to their citizens. Their projects, in most cases, generate multi-dimensional, multi-sectoral results and impact. In addition, there are major differences between public and private applications of the BSC model.

In terms of its objectives, an LGU has its own 'mission to accomplish' while a firm has its 'strategy to achieve' (Kaplan & Norton, 2004). From the 'Finance' perspective, it is not appropriate for an LGU as it is not a profit-making entity. An LGU has to pursue how to effectively and efficiently provide the quality of services to meet citizens' needs. The 'Customers' perspective in the private sector is not equivalent to public sector citizens as they are both beneficiaries (consuming services) as well as stakeholders (taxpayers). So citizens are a group that also monitors whether an LGU's performance is fair, transparent, and sound. Kaplan and Bower explain that public organizations have three high-level objectives to accomplish to fulfill their missions i.e. *Cost incurred, Value created, and Legitimizing support.* (Kaplan & Bower, 1999) These are all related to the differences mentioned above. *Cost* includes the public organization's direct expenses and social costs to be covered by citizens and services providers. Minimizing these costs and optimizing delivery of services to meet the needs of citizens is critical. Value creation is hard to measure but Kaplan explained that organizations can identify outputs by BSC and benefits can be judged based on the outputs and their inputs. *Legitimizing support* is associated with funds (= financier/donor/taxpayer) required to provide stable and quality services. To do so, they need to provide rational justification of their actions accompanied by accountability. On 'Balanced' side, the value creation framework for public sector the three perspectives as follows (Fig. 3).

One of the explanations of the term 'value creation' in SC development is to make cities resilient and sustainable which is similar to the concept of competitiveness in the private sector. In particular, SC does not have common definitions and approaches vary. A long-term strategy setting a clear vision is indispensable to create better conditions for community well-being, including basic service provision, safeguarding the environment, and creating job opportunities for economic development to sustain wellbeing. The framework only demonstrates a set of broader perspectives. To make SC with their unique values competitive, it is helpful to understand for whom organizations work for, what they have to deliver, how to deliver and how to improve delivery. Also it is useful to consider a set of main activity domains (or areas) that could form a SC development framework (see next section)

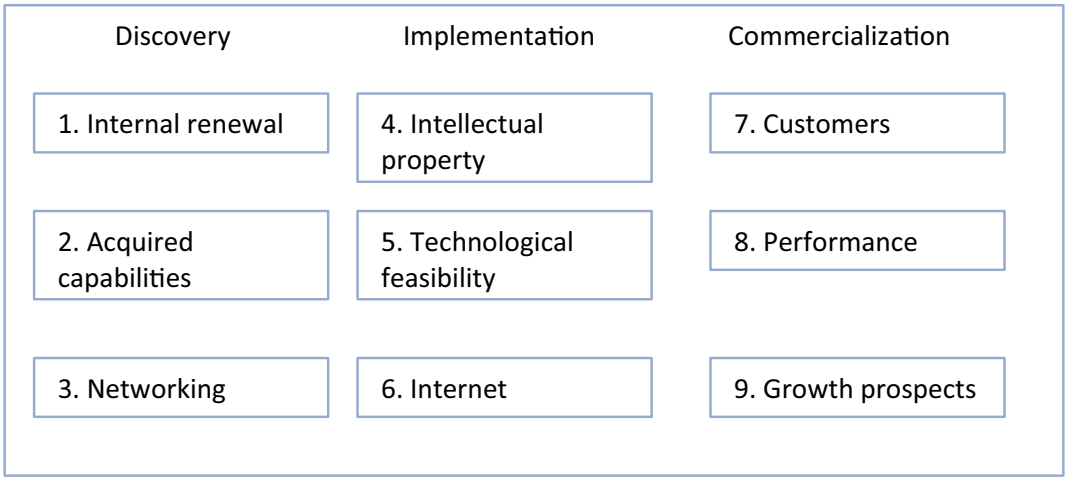

Fig. 2. The Value Chain Scoreboard (Lev, 2001).

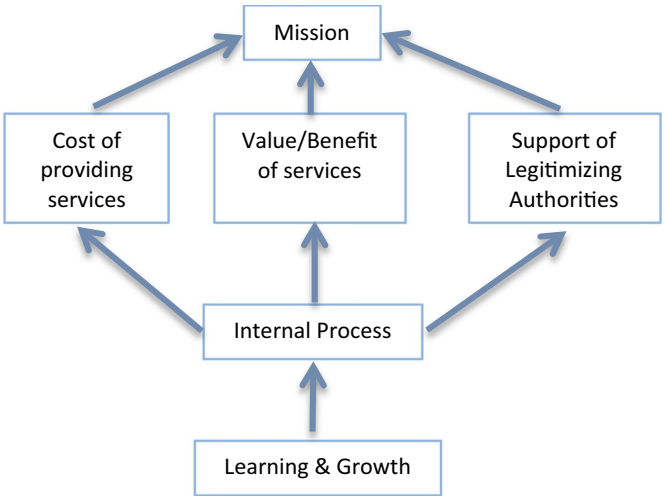

Fig. 3. Value creation framework for public sector organizations (Kaplan et al., 1999).

in alignment with respective LGU's policies and plans.

Three objectives that demonstrate the characteristics of public organization can also be useful to understand SC development domains (or areas). In SC context, they can be defined as follow:

(i) Cost of providing services: In the SC context, this objective covers a system or platform that will be a vital for developing SC. Without a quality communications network and community engagement, SC development will be just end up with a top-down, narrow scope, and non-sustainable form.

(ii) Value/Benefit of services: This objective is something that Local authority, service providers, or even citizens/communities themselves can contribute to creating new values for the SC. Innovative approaches are key under this objective.

(iii) Support of legitimizing authorities: In the SC context, citizens are legitimizing authorities who pay taxes for making local authority provide necessary services. A unique aspect is that the citizens have dual roles, one is financer (=tax payer) and the other is customers for local authorities and service providers. In this regard, this covers a various type of services that make citizens life safe and well-being, i.e. equal and smart services for basic needs, security and others.

The next section will examine this in more detail and delineate a broader category of soft assets to underpin the SC development.

3. SC development framework and soft assets

3.1. Citizens' reality count - SC development (by Local government unit/ LGU) framework and soft assets

There are a growing number of countries advancing SC projects with different objectives and approaches. Although Government of India acknowledges that the definition of SC varies from city to city, it provides some definitional boundaries. India's SC development is designed to meet citizens' needs by developing an urban ecosystem, including physical, social, and economic infrastructure. India launched its Smart Cities Mission in 2016 to upgrade 100 cities in different types of development: i) improvement (retrofitting); ii) renewal (redevelopment); iii) city extension (greenfield development); and iv) a Pan-city initiative which smart solutions are applied covering larger parts of the city. It is designed to set an example of SC development to replicate concepts that catalyze scaling-up across all India (Ministry of Housing and Urban Affairs, Ministry of India) A current overview of the Smart Cities Missions initiative addressed mainly two interesting points: (i) source of financing for infrastructure rely on public sources of funding (which means India's SC mission heavily focuses on infrastructure). Power is decentralized to state governments and away from local democratic institutions; and ii) public engagement is not well promoted. (Center for Policy Research, India).

China's SC definition introduces 'a new concept and model which utilizes the next generation of information technology, such as IoTs, cloud computing, big data, to promote smart urban planning, construction, management and services for cities' (UNDP 2015) China started promoting bottom-up ICT and innovative initiatives that promote human-centered and equitable development. This encourages self-adjustment and self-governance within society and public participation for significant urban decisions. Despite this new type of urbanization plan, LCUs are in transitions from providing information to citizens to encouraging bottom-up participation using ICT-platforms. Time is needed to deliver such policies. But at the same time, the UNDP report also recommended some initiatives to promote the need for a clear vision and strategic plan, a coordination mechanism, gaining buy-in from stakeholders, sound budget allocation, protecting people's privacy and enhancing cyber security to build trust. (UNDP 2015).

Both cases addressed some traditional but very difficult issues around expanding SC infrastructure. Although both explicitly mention a people-centered approach, the outputs to date during the middle phase of SC development are not encouraging. Since both have different country and political systems and ways of developing SCs, there is no point to compare in detail. However, one issue yet to be solved is the need for well-balanced bottom-up and top-down SC approach to ensure resources and system sustainability for future scaling-up. Balance is important, which is the basis for SC value creation.

These cases suggest ways in which the proposed soft assets co-value creation in SC development explained later can be operationalized. The model can also complement existing models.

Neirotti, De Marco, Cagliano, Mangano, and Scorrano (2014) addressed two different SC approaches. One is 'the cities can steer themselves to achieve the goal of optimization'. This is based on the use of ICT and associated hard infrastructure that is the center of planning and integrating urban operations. The other is 'the way of building SCs as being based more on bottom-up approaches' (Neirotti et al., 2014). Focusing on a bottom-up approach, the cities could enhance creative, innovative and livable city development by incorporating collective intelligence and creative ideas from both citizens and the LGU. They conceive of the evolution of SCs as producing an urban domain or area. To do so, they use an effective model of how to measure the level of soft sector investment against the hard sector. But the model omits any specific study on SC value creation from soft assets components by applying the private sector concept of a value creation mechanism. Since a SC is an entity established to provide services to its citizens, it needs to adjust and align to produce key hardware and services necessary to build a sustainable SC. This constitutes a value creation mechanism that will also measure how bottom-up and top down models provide a good balance in each specific SC context. The model that captures an overall SC value creation model can also be complementary to the existing model to identify core requirements for SC development. There is also a study to apply the private sector firm's value chain framework to LGU management system. The study examined the customized management models but omitted a methodology for soft assets value creation in SC.

3.2. (Soft assets-focused) SC building framework

Key points were examined in the previous sections including the vital roles of soft assets in SC development; firm's value chain framework and its usefulness to SC development context; challenges of SC development and the need to a balance between the bottom-up and the top-down approach, sufficient to create the desired SC sustainability. The LGU should concentrate its efforts to create a SC where citizens' reality (life on the ground) is the primary focus. An appropriate SC value creation framework identifies key domains (or areas) vital for

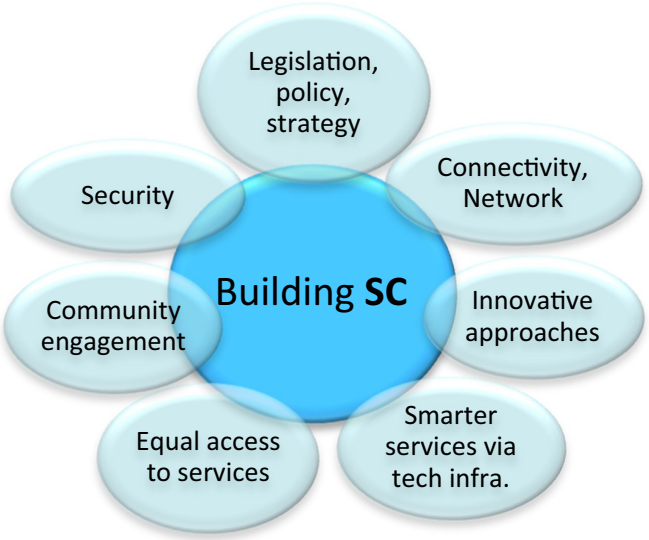

Fig. 4. SC building (Citizens' reality counts) framework.

securing "bottom-up" citizens' well-being and "top down' improving SC's effective and efficient operational functionality.

Taking into consideration the five perspectives reviewed in the previous section, Fig. 4 shows a possible set of domains (or areas) that could form a SC development framework. These domains (or areas) are developed by referring to the value chain framework and the idea of a citizen-centered SC development approach. They can be modified and analyzed further depending on the specific objectives and scope of the SC development. Most of them are self-explanatory but here are some explanations:

'Legislation, Policy, Strategy' is the backbone of an LGU's activities and directly support its missions. Regarding *'Connectivity and Network'*, two levels of connectivity and networks are considered. One is between LGU and communities, and the other is among communities. This approach can be used as the foundation of establishing a quality communications channel to create a feedback system to improve service provision. *'Innovative approaches'* generally indicates creating new and effective approaches for making the status better. But in this framework, problem identification and solving competencies at both LGU and community level are also included. The value and benefit for citizens is highly relevant to this domain (or area). *'Smarter services* via *technology-linked hard infrastructure'* directly linked technology issues to provide effective and efficient services not only meets the beneficiaries/stakeholders (=citizens) needs, but also secures continued support from legitimate authorities. *'Equal access to services, Security'* is one of the principles of city development. This domain links to continued support from stakeholders and beneficiaries as well as being crucial to maintaining social stability and citizen wellbeing. *'Community engagement'* is a driving force of improving service quality as well as a key factor in strengthening community capability and nurturing city by citizens over the long time. *'Security'* is also the basic principle that is the same as 'Equal access'. By provision of stable and reliable services, LGUs can secure funding and other soft assets to plan and implement LGU activities for its citizens and community.

3.3. Soft assets

To understand the definition of soft assets in relation to the set of possible domains (or areas) that could form a SC development framework, Table 2 shows the broader groups of the components of soft assets (modified by individual context). These are further elaborated with more specific SC objectives or more specific activities instead.

These are broadly similar to the intangible assets components that are briefly reviewed in the earlier section. Sustainable urban development for SCs in this paper incorporates public sector development initiatives, including international development assistance perspectives and project outcomes. The definition of soft assets in this context is to strengthen LGU's as well as citizens/communities capacity to support building and maintaining the domains (or areas) that form the SC development.

For LGUs as the main implementer of the public works, strengthening the governance system including policy-making, planning, to the provision of best services to their citizens from public works and services is the key, as well as a basis for creating innovative solutions that are supported by the soft assets. To build a solid foundation to accomplish LGUs missions and obligations, implementation of public works requires dealing with a range of issues including political, analytical planning and systems, and accountability.

Within this context, strengthening citizens' engagement in the development process also needs to be cultivated on a number of fronts in both formal and informal social and community engagements and in each of their own daily lives. Assuming LGUs and Citizens' anticipated capacity-development require several categories of intangible assets explained earlier. Each of the soft asset categories are interlinked but broadly divided into three groups namely *organizational capital-related* i.e. a) Institutional assets, and b) Framework and Systems; *Social capital-related* i.e. c) Social assets; and *Information and knowledge asset-related* i.e. d) Intellectual products and e) Computerized products and information. The aim of this categorization and grouping is to establish a method of measuring the effectiveness of soft assets outcomes and impact beyond simply using accounting measures. The listed soft assets, therefore, highlight the general type of items that can help LGUs (and communities) effectively operate to attain their missions and objectives. A narrative or qualitative analysis is better than quantitative analysis to assess the impact of the soft assets. Regarding 'Computerized products and information', ICT-linked hard infrastructure is becoming a more important force for city development. Therefore, the soft assets section is divided into 'Soft assets' and 'Medium assets'. Data, apps, and other related technologies are included in this category. A useful distinction is to classify the assets by its 'soft degree'. This means that the lowest level of soft assets such as computerized products have a clear value estimate while the higher degree of soft assets such as human, institutional knowledge and capital that are difficult to distinguish and quantify. These types of assets are an unambiguously primary source of unique value in SC development but it is difficult to evaluate.

4. Value creation for soft assets in SC development by LGU and community

Within each specific context, soft assets produce unique outcomes and impact. There are also two different types of values that are created directly and indirectly as shown in the flowchart below. One is the value that is associated with forming fundamental design of SC development, e.g. citizen-centric, technology-centric. The other is the value that is associated with yielding social benefits or impact from social infrastructure provision (e.g. hospital, school, housing, and others). Corrado, Haskel, and Jona-Lasinio (2015) stated that such social benefit is the spillover or externalities that result from citizens consuming the social goods and services. Creating and delivering of goods are supported by hard infrastructure but greatly strengthened by soft assets, which are a dominant source of innovative solutions. Although both are different types of values, there is always a two-way interaction between service providers and consumers/citizens. For multi-tier levels of SC development, there is the LGU (as a supplier) and Citizens/Community (as consumers, beneficiaries, and stakeholders). The value-added of soft assets is created at both ends of the spectrum and their processes are invariably interlinked. Fig. 5 sets out one possible approach to explain a value creation framework.

Using the idea of co-value creation, the framework above combined

Table 2
Proposed broader set of soft assets classifications.

Classification	Hard assets	Soft assets	
Sub classification Type of assets	Hard assets a) Assets - Physical infrastructure	Soft assets a) Institutional assets (organization capital) - Individual capital, knowledge (function-specific) - Institutional capital, knowledge, professional technical knowledge & experiences, management capacity, - Training (both for individuals and institutional contexts) - Learning and growth capacity - Relationship with external stakeholders - Institutional credibility, reputation b) Framework & systems (organization capital) - Policy, strategies, plan, c) Social assets (social capital) - Social system - Community network - Social norms, value d) Intellectual product (information and knowledge-related capital) R&D, Reports	Medium assets e) Computerized products & information (information and knowledge-related capital) - Apps - Database (Information and/or applications that can be integrated into physical infrastructure)

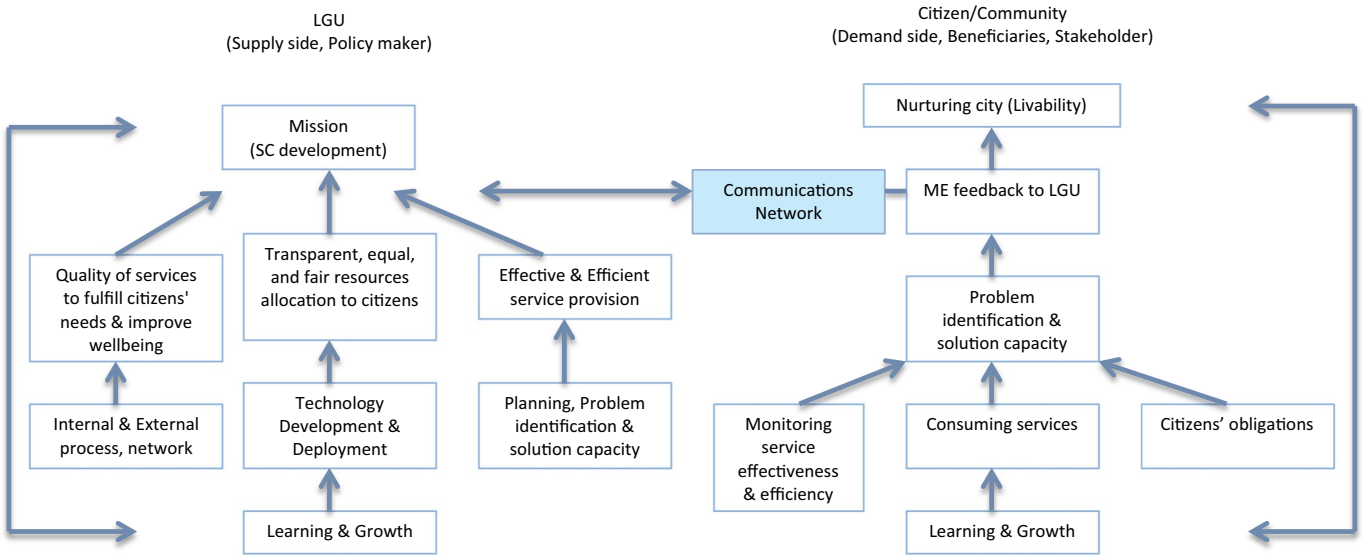

Fig. 5. Soft assets co-value creation in SC development (LGU and Citizen/Community).

two sides of the equation - LGU and Citizens/Community. Both are linked by competencies that are mentioned in the previous section. These are problem identification and solution, and creation of feedback loops to account for the citizens' reality (citizen-centered) emphasis allowing a mechanism for service recipients to evaluate service delivery. On the LGU side, high-level objectives showed in Fig. 3 identify general areas of activities.

In responding to Fig. 3. three key objectives can be translated into followings:

- "Cost of providing services" that is closely linked to "Legitimizing support" in terms of a source of funding (= tax payer's money). In the SC context, this can translate into 'Quality of services to fulfill citizens' needs and well-being'. The foundation of this services is also linked to a level of quality of communications channels and community engagement, which is costs of basic (soft) infrastructure to build SC.
- "Value/Benefit of Services": This is translated into services that can improve citizens well-being and maximize provision of services to meet citizens' needs.
- "Support of legitimizing authorities": This means LGU or service providers have to make citizens satisfied with their services. Since they are both clients as well as a source of financial resources (= tax money) for provision of services, LGU or service providers has to keep considering good planning for quality of basic services provision, security and other necessary needs in society.

The pillars of LGU's good governance for an international development organization (ADB, 1999) - Accountability[3]; Transparency[4]; Predictability[5]; and Participation[6] can also be considered critical to any SC development project. Although these are not reflected in Fig. 5, the four pillars are foundations required by LGUs to serve the citizens to provide

[3] **Accountability** is needed for the ability of managing public sector and enterprise; conducting public and civil sector reform, and managing finance and spending fund.

[4] **Transparency** is important for LGU to keep relevant and understanding information open for city administration, city council, and the citizens (general public) to be adequately informed about the performance of the locality.

[5] **Predictability** relates to develop law and legal frameworks. At the same time, it is a capacity of strategic prioritization of LGU's financial resource to plan for the provision of services.

[6] **Participation** is to facilitate participatory development process or the involvement of local citizens, NGOs, public officials and employees, and other stakeholders for the sound program plan in design, expenditure, monitoring service performance and efficiency.

equal and quality of services. It is the fundamental responsibility of LGUs to serve their citizens. On the Citizen/Community side, the SC development focus is on citizens-centered (citizens' reality counts), and the flow chart uses the quality of communication and delivery network as enabling citizens/community to provide feedback as 'service consumer (beneficiaries)' and 'stakeholder (taxpayer)'. Again there needs to be reliable problem identification and solution capacity to endow their cities with ownership. Fig. 5 is also a useful tool for examining how key action areas are changed and connected as well as how the citizen-centered approaches are formed in different SC development settings.

Measuring the contributions of soft assets to value creation, outcomes, and impact is difficult. The World Intellectual Capital/Assets Initiative (WICI, 2016) established a guiding principle on integrating narrative communications and quantified information for corporate reporting to deal with the limits of current reporting models. (WCCI, 2016) This paper does not focus on accountancy type reporting but the combination of the narrative approach and Key Performance Indicators (KPIs) which help to measure the roles of soft assets and their contribution to the value creation process. Use of the narrative approach and KPIs are not new for evaluating non capital-intensive assets or infrastructure. But a new set of guiding principles in evaluating SC development and soft assets contribution can be derived from the BSC model and SC building framework as well as the co-value creation framework. This helps examine how to optimize those assets throughout the value creation process in SC development.

5. Conclusion and further research

In this paper, examining the definition and components of soft assets helps to understand their important role to enable an LGU as well as citizens/communities to support building and maintaining the key areas that underpin SC development. Soft assets are broadly categorized under the umbrella of organizational capital, social capital, and information and knowledge-related capital. These soft assets are intricately linked to the cycle of improving the quality of services and a prime source of innovative value creation for SC development. In this context, co-value creation evaluation methodology is becoming a primary way to forge sustainable and resilient development. Some of the relevant competencies addressed in this paper are the communications network between LGUs and citizens/communities as well as problem identification capacity at both the level of LGUs and citizens/communities. They are key for a co-value creation framework underpinned and strengthened by soft assets to provide a principle source of innovative solutions for SC development.

For future research, a list of soft assets components will be further extrapolated, modified and applied to specific cases. A refined framework would be helpful to determine how soft assets can be optimized to yield context-specific SC outcomes and impact. A more in-depth analysis of other types of the 'city-centered/citizens' reality counts' SC development models would help identify the uniqueness of each SC as well as clarify common soft assets and competencies that are fundamentally required. Having said that, it is also important to consider the importance of top-down approach at LGU and country level to mobilize more resources, technical skills and scaling-up of value-creation initiatives. The important point is to find models or systems that can strike a balance. In this regard, the value creation model needs to be further refined. Another area of future work is to devise a more standard evaluation framework. The well-known models that are briefly reviewed in the earlier section focus on asset management and the needs for a cogent value creation framework. They can measure management performance and outputs but final outcomes and impacts require the development and additional measurement tools. One approach would be a combination of the narrative evaluation approach with supporting KPI system to strengthen quantitative outputs.

Devising a set of guiding principles and KPIs in evaluating soft assets contribution in SC development is one of the areas that should be examined further by reviewing the needs for a value creation framework to assess an SC's core competencies. The important point is that evaluation and measurement themselves should not become the ultimate purpose. It is clear that using soft assets need to receive a higher priority and their benefits capable of more accurate measurement and evaluation by LGUs engaged in SC development. 'Soft' technology is essential, but a range of both technological and non-technological assets is critical to long-term sustainability and the welfare of LGU citizens. It is vital for the LGUs to strengthen institutional capacity and governance but also benefit from formal and informal feedback loops, communications channels, community dialogues, social media platform and other 'soft' components to ensure more effective delivery of basic services throughout the city. Having a robust value framework to measure the impact and outcomes of these soft assets is a major priority for SC LGUs and the research on this topic covered in this paper points the way to developing more reliable methods for evaluation and measurement.

Appendix A. Classification of intangible categorization

Framework	*Scorecard type framework*				*Reporting framework*		*Accounting-based framework*	
					Knowledge management tool	*Strategic management*		
	Kaplan & Norton (Strategic Readiness)	*Skandia (Intellectual capital)*	*Sveiby (Invisible capital)*	*Lev (Value Chain Scoreboard)*	*Danish Intellectual Capital Statement. Guideline*	*Meritum project / Meritum Guideline*	*Corrado, Hulten, & Sichel (CHS) (Intangible capital)*	*Corrado, Hulten, & Jona Lasinio (Public Intangibles)*
What are intangible assets / Intellectual capitals?	Intangible assets from learning and growth objectives and value of intangible assets	Intellectual capital provides an effective instrument to manage and develop the company, as well help strengthen competency.	Intangible assets were considered in knowledge organization context and they were described as invisible capital.	Intangible assets as an 'asset that is a claim to further benefits that does not have a physical or financial (a stock or a bond) embodiment' (Lev, 2001)	Intellectual capita = knowledge resources 4 interrelated elements (knowledge resources = Core components) that should describe a corporation's knowledge resources	Intangible assets include three following capitals (under Intangible Resources & Activities - see below)	Intangible capital should be capitalized in national accounting system that enables to capture new economic development & change measuring economic growth.	Used CHS model for categorization but broaden the concept of capital (mostly tangible) to that includes intangibles and long-lasting social assets.

Core components / (innovation focused) information to assess readiness	**People/ Human capital** (skills, talent, employees' knowledge)	**Intellectual capital** (Product names, branded products, customers, distribution, competitors, management system, IT system, core competence, key persons, partners, etc.)	**Individual/ People's competence** (Individual ability to act in various situations, including skill, education, experience, values and social skills.)	**[S1] Internal renewal** (Research and development; Work force training and development; Organizational capital, processes) **[S1] Acquired capabilities** (Technology purchase; Spillover utilization; Capital expenditures) **[S1] Networking (**R&D alliances and joint ventures' Supplier and customer integration; Communities of practice)	**Employees**	**Human Capital** (knowledge that employees take with them when they leave the firm, including the knowledge, skill, experiences and abilities of people)	**Computerized information** (software, databases)	**Information, Science** (software, Open data, R&D, Cultural and heritage, mineral exploration)
	Technology/ Information capital (database, information system, networks, technology infrastructure)	**(under Intellectual capital) Human capital**	**Internal structure** (Organization - patents, concepts, models, and computer and administrative systems)	**[S2] Intellectual Property (**Patents, trademarks, and copyrights; Licensing agreements; Coded know-how) **[S2] Technological feasibility (**Clinical tests, Food and Drug Administration approvals; Beta tests, working pilots; First mover)	**Customers**	**Structural Capital** (knowledge that stays within the firm, comprising organizational routines, procedures, systems, cultures, and databases)	**Innovative property** (R&D, entertainment & artistic originals, design, mineral exploration)	**Organizational Competencies** (Brands, Organizational capital – professional and manager capital, purchased organizational services -, Function-specific human capital – employer provided training)
	Organization climate/capital (firm culture, leadership, alignment of people with firm's strategic goals, employees' ability of knowledge-sharing)	**(under Intellectual capital) Structure capital** *(under Structural capital)* *-Customer capital* *-Organizational capital*	**External structure** (Relationships with customers and suppliers, brand name, trademarks, and reputation or image)	**[S2] Internet (**Threshold traffic; Online purchases; Major Internet alliances) **[S3] Customers (**Marketing alliances; Brand values; Customer churn and value; Online sales) **[S3] Performance (**Revenues, earnings, and market share; Innovation revenues; Patent and know-how royalties; Knowledge earnings and assets) **[S3] Growth prospects (**Product pipeline and launch dates; Expected efficiencies and savings; Planned initiatives; Expected break-even and cash burn rate)	**Process** **Technologies**	**Relational Capital** (all resources linked to the external relationships of the firm, comprising human and structural capitals, stakeholders, perceptions about the company)	**Economic competencies** (brands, organizational capital – manager capital & purchased organizational services -, firm specific human capital -employer provided training)	

Perspectives / Monitoring areas / Measurement criteria / Steps	[Perspectives] - Financial matrix - Customer - Internal Process - Learning & Growth	[Perspectives/ Competencies] - Financial Focus -Customer Focus - Process Focus - Renewal & Development Focus - Human Focus	[Monitoring indicators] i) Organizational growth/ Innovation (renewal/utilization); ii) Efficiency; iii) Stability	[Measurement criteria] i) quantitative; ii) standardized; iii) Empirically linked to value	[Interrelated elements in IC model] - Knowledge Narrative - Management challenge - Initiatives - Indicators	[key section of reporting] - 'Vision of firm' - 'Summary of intangible resources and activities' (in where intangible resources are classified) - 'System of indicators'		
Source	Kaplan and Norton (2004)	Edvinsson and Malone (1997)	Sveiby, 2001	Lev (2001),	Guimón Guimón (2009)	Guimón Guimón (2009)	Corrado, Hulten, and Sichel (2009)	Corrado et al. (2015)

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