

French labour market transformation in the smart cities era expansion: New smart service systems – New job skills policy development ? (work in progress)

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Abstract

According to Schumpeter, every new socio-economic cycle occurs as a result of new kinds of technology that transform society to offer novelties, such as consumer products/services, production methods, standards, markets, types of industrial organisation, academic formations, job skills and works. Each business long cycle or Kondratiev wave has four phases: 1) depression, 2) recovery, 3) prosperity or expansion, and 4) recession. The current Smart City era that several researchers have related to “the sixth Kondratiev wave” is associated with smart technologies (i.e. big data, Internet of things). Nowadays, the sixth wave of Kondratiev is moving from the recovery phase to the expansion phase. To our knowledge, there is little academic literature that analyses this wave expansion phase, the transformation of job skills and works in the actual Smart City labour market. Data was collected through qualitative methods (i.e. job interviews, observations, career fairs), as well as from *Emploi Public*, *LinkedIn* and *Pôle Emploi*. The author analysed data through qualitative content analysis, quantitative text mining and topic modelling analysis. Their research proposes a framework offering a way to highlight and analyse the labour market transformation which would be useful for creating public policy and anticipating the change of workforce skills concerning service industries as art, culture, tourism, health, among others.

Keywords: Smart City, labour market transformation, workforce requirements, job skills policy development, service industries (art, culture, tourism, transport, health...), innovation, neo-Schumpeterian.

1. Introduction

A Smart City's principal goal is the medium and long-term improvement of the quality of life in a territory. According to (Cocchia, 2014, p. 13), the

"concept of Smart City embraces several definitions depending on the meanings of the word “smart”: intelligent city, knowledge city, ubiquitous city, sustainable city, digital city, etc. Many definitions of Smart City exist, but no one has been universally acknowledged yet."

This concept refers to a variable geometry complex phenomenon of an urban service system transforma-

tion through Information and Communications Technology (ICT) centred service systems, and non-ICT-centred service systems, configured ad-hoc according to given needs Silva-Morales (2017). In this sense, an urban agglomeration must design and implement their urban service system transformation projects based on their local context and their needs in the short, medium, and long term. Smart City projects articulate other related initiatives at local, regional, and national/global levels (Piro et al., 2014; Mosannenzadeh et al., 2017). Bannister & Connolly (2014) have defined transformation as "a change that creates a recognisable and significant difference between the prior and the posterior state of the transformed entity". These authors argue that in the con-

text of governance, transformation can take the form of new institutions (i.e., norms, standards) a new way of working, or an innovative new public service system. In this sense, we point out a lack of adequate theoretical and methodological frameworks to analyse the process of a labour market transformation in a public urban service system becoming smart. This research addresses this issue through the following questions:

How should the actual labour market transformation concerning territorial service system becoming 'smart' be highlighted? What knowledge, skills, abilities and roles are needed to contribute to service system's transformation and job skills policy development for services industries ?

2. Background

Subsection 2.1 presents an institutional approach for police development, subsection 2.2 presents a Kondratiev wave approach to analyse service system transformation, while subsection 2.3 presents studies about labour market transformation in various contexts.

2.1. Policy development, pluralism and institutional complexity: service innovation logics multiplicity for new smart service systems

For Greenwood & Suddaby (2006), the perspective of institutional logics emerges as a means of explaining the institutional change. According to these authors, the process of articulating different levels of analysis representing individuals, organisations, industries and society at the micro, meso and macro levels can be linked through the institutional logic. The institutional logic approach comes from the seminal paper of Friedland & Alford (1991), Which suggest the presence of a dominant logic within the existing overlapping institutional orders in contemporary Western societies, for instance, the family, the religion, the bureaucratic state, and also the market. For this authors, this central logic concerns a set of fabric practices and symbolic constructions, which constitute the underlying principles of every one of those institutional orders, available to organisations and individuals (p. 232)." They also suggest that the institutional logic of

capitalism is the accumulation and also the commodification of human activity.

The concept of institutional logic was presented by Alford et al. (1985) to examine how the conflicting logics of capitalism, bureaucracy and democracy shape the formation of the modern state. Between the years 1990 and 2000, some seminal works acknowledged institutional logics as what characterises the content and also the meaning of institutions (Friedland & Alford, 1991; Haveman & Rao, 1997; Thornton & Ocasio, 1999; Scott et al., 2000). They make it possible to link several levels of analysis concerning an inter-institutional system: a) the societal level, b) the level of the field and c) the level of individuals (Friedland & Alford, 1991). Thornton & Ocasio (1999, p. 804) define institutional logics as "the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organise time and space, and provide meaning to their social reality."

Institutional pluralism refers to contexts where actors are confronted with a variety of more or less complementary institutional logics allowing cooperation or competition. On the other hand, institutional complexity refers more specifically to how individual and collective actors face and respond to the conflicting demands associated with different logics (Ocasio et al., 2017).

Institutional complexity is a variation of the institutional theory that emphasises multiple, sometimes concurrent, logics and complex organisational fields in which organisations can have multiple responses and feedback cycles (Thornton et al., 2012). Although most of the work after Friedland & Alford (1991) continued to analyse the presence of multiple logics, Thornton & Ocasio (2008) identified two ways of approaching around two main research categories which have been used in recent research:

- Research which considers the way in which a logic pre-dominates in a specific field, being a "dominant" logic in this field, influencing the behaviour of social actors.
- Searches which considers the "coexistence" of multiple logics for long periods, without a predominance of one logic over the others.

Study in the first strategy investigates how one dominant logic becomes "replaced" by another or disappeared in a given time. Even the second line of studies suggests a longitudinal analysis of the "coexistence" of multiple logics in a particular field. The researcher must, however, concentrate on how elements of various institutional logics coexist within a specific period. For [Besharov & Smith \(2014\)](#), it is given or acquired that the multiple institutional logics present a theoretical puzzle and that various logics, often conflicting, characterise the organisational fields. In practice, an institutional logic can help, delay or even prevent different processes of change ([Järvenpää & Lämsiluoto, 2016](#)). According to [Busco et al. \(2017\)](#), institutional studies have also observed that multiple and heterogeneous logics struggle to persevere over time, as they are altered by dynamic tensions between different power and interest groups which simultaneously advocate partitioned logics. In this context of multiple institutional logics and in line with [Silva-Morales \(2017\)](#), we define a smart and inclusive service system as follows:

A system that allows the co-creation of public, economic or sustainable value and the management of multi-sectoral services such as health, education, mobility and transport, employment, urban resilience, culture, tourism, sport, leisure, in an interoperable, user-context sensitive way. It constitutes a complex adaptive system allowing the combination of individual and collective service logics such as (Table 1):

- Individual service logics, for example:
 - The customer-dominant logic of service ([Heinonen et al., 2010](#)); the customer and employee logics ([Kingman-Brundage et al., 1995](#)).
- Collective service logics, for example:
 - The goods-dominant logic ([Mont, 2002](#); [Manzini & Vezzoli, 2003](#); [Vargo & Lusch, 2004](#); [Tukker, 2004](#); [Miles, 2008](#)); the public service logic ([Osborne et al. \(2015\)](#); [Osborne \(2018\)](#)); the service-dominant logic of the market ([Vargo & Lusch, 2004](#);

[Lusch & Nambisan, 2015](#); [Vargo & Lusch, 2016](#)); and the technical logic ([Kingman-Brundage et al., 1995](#)).

Urban service system digital transformation to become smart through the hybridisation or combination of several service logics can be studied through following construct: complex service system, adaptive service system, multi-level service system, human-centred service system, product-service system (PSS).

In the case of a public service system, the complexity increases in the co-creation process because it is necessary to consider the whole population, in particular those vulnerable to exclusion. Technical, societal and organisational challenges in public service have been highlighted by [Bloch & Bugge \(2013\)](#). To create data and smart-technology driven smart service systems, it is necessary to have job skills in data science, deep learning, embedded systems, satellite remote sensing, urban resilience and management, among others. Table 1 shows some institutional logics involved in the job skills policy development co-creation process.

2.2. Socio-economic change: the Kondratiev waves approach

The Russian economist Nikolai Kondratiev proposed the idea of waves or socio-economic cycles in the 1930s ([Schumpeter, 1939, 1976](#)). According to Kondratiev, societal changes have been connected with the development of long socio-economic cycles for roughly 40–60 years. Long cycles are called "K waves" ([Wilenius, 2014, p. 36](#)). [Wilenius & Casti \(2015\)](#) report that each wave is driven by a specific technological innovation generating a *dominant technological paradigm*" ([Dosi, 1982](#)). There may be shorter or faster cycles.

According to [Wilenius & Casti \(2015, p. 336\)](#), Schumpeter's research on socio-economic cycles was in line with Marx's historical approach (1887, 1893, 1894). The financial crisis of 2007–2009, also called the subprime crisis, marked the end of the 5th Kondratiev wave and the emergence of the 6th Kondratiev wave around the year 2010. Currently, we are in the expansion phase of the 6th Kondratiev wave. According to these authors, the

Table 1: Some service innovation logics concerning smart service systems policy development. Source: [Silva-Morales \(2017\)](#) from literature review.

Institutional logics	Definitions
Service-dominant logic (SDL)	The SDL appeared for the first time in 2004 (Vargo & Lusch, 2004) claiming that management sciences have been dominated for a long time by a "Dominant Logic of Goods or Products". According to Orlikowski & Scott (2015) , this product logic is not relevant for the analysis and understanding of the service economy. These researchers (p. 203) argue that service logic replaces the old product logic. The SDL has evolved since 2004, and has moved from the concept of co-production to the concept of co-creation by proposing two new fundamental principles (Vargo et al., 2008). In the SDL, the term "services" in the plural implicitly designates the output units, whilst the term "service" refers to collaborative processes where skills/resources are used for the benefit of another entity (Lusch & Nambisan, 2015). In 2015, the SDL and its fundamental principles were transposed from the field of marketing to the field of management of information systems, in the form of a conceptual framework (Lusch & Nambisan, 2015). The SDL has received several criticisms and we agree with the criticism of Hietanen et al. (2017) . These authors criticise the SDL for its tacit neo-liberalism. In this context, we consider the SDL as the logic of market service, focused on economic value and as indicated by Hietanen et al. (2017) .
Public service logic (PSL)	For Osborne et al. (2015) ; Osborne (2018) the PSL and its implications for public services are in their infancy. Osborne (2018) argued for a separation of the PSL (Public Service Logic) from the SDL for the following reasons: <ul style="list-style-type: none"> • PSL requires considering co-production and co-creation of "public" value. • SDL seeks to explore how to leverage value creation in private sector service companies for customer retention and profitability. However, for PDL, in public services, the repetition of service is likely to be seen as a sign of service failure rather than success.
Customer dominant logic (CDL)	Study of the human dimension which can contribute to new insights on the concepts: <i>of human centred service innovation, human centred service system</i> (Heinonen et al., 2010).
Service logic and service system	Service logic describes how and why a unified service system works. It is a set of organising principles that govern the service experiences of customers and employees Kingman-Brundage et al. (1995, p. 21) .
Customer logic	<i>The client's logic</i> which is the underlying reason that drives the behaviour of the client according to their needs and wants, which are often unpredictable. Customers often have expectations regarding their service experiences (Parasuraman et al., 1991 , cited by Kingman-Brundage et al., 1995, p. 23). The client's logic signals the client as a consumer and as a co-producer of the service. It can be addressed by exploring the question of <i>"What is the client trying to do and why?"</i> (Kingman-Brundage et al., 1995, p. 24).
Technical logic	The <i>technical logic</i> is the "motor" of the service's operation. According to these authors, the technical logic is congruous with the concept of service, creating value by customers. However, when the technical logic is isolated from the concept of service, technical logic creates mutual disappointment for clients and representatives and "leads its claim life". This logic stems from hard and soft technologies, from politics and business rules. For this authors, technical logic address a question repeatedly asked by the employee and the customer: What is my role and how to perform it? (Kingman-Brundage et al., 1995, p. 24).
Employee logic	<i>Employee logic</i> is the fundamental individualistic reason that motivates the behaviour of employees. This logic gives rise to unpredictable and conflicting benefit performance, particularly in cases where work methods are vague, and workers are constrained to design their work processes (Kingman-Brundage et al., 1995, p. 25).

waves always begin with technological innovations that penetrate the economic and social systems, leading to prolonged economic recovery and a constant increase in productivity: this development integrates new value systems, new social practices and new organisational cultures. During the past 200 years, there were four phases involving an economic crisis (Schumpeter, 1939) characterising each K wave: "*Prosperity or expansion phase, recession, depression, recovery*". His idea was that the succession of these phases was much more important than any other type of business, and that it is mainly dependent on psychological training that can lead to euphoria during periods of success and inversely to gloom during a turnaround. The recession would be the natural result of the rapid expansion that precedes it. Russian researcher Togan-Baranowsky had in fact already linked the phases of expansion and withdrawal to investment movements. To Wilenius & Casti (2015, p. 2) in general, each cycle encompasses the following events:

- a) New technology industries emerge, replacing old products or services.
- b) A new economic boom spreads with the rise of commercial markets.
- c) New value systems, norms, and rules begin to dominate, governing public debate and planning.
- d) A new organisation culture emerges, based on the new dominant technology.
- e) **New professions emerge, adding new workforce requirements.**

Points (a), (c) and (d) below have been analysed by the longitudinal research of Silva-Morales (2017) in the public service system transformation context of the French Smart City strategy. The present work focuses on point (e) concerning the emergence of new professions and workforce requirements for the expansion of the 6th Kondratiev wave in a Smart City era in France. Concerning the 6th wave, Wilenius & Casti (2015, p. 340) point out that:

"in this emerging sixth wave, the next big race to which the principal thrust of our technological

development, economic growth, social cohesion, and even our cultural and spiritual activities will be devoted, has to do with making our systems more intelligent. A lot of this intelligence must come from understanding how we can use our natural resources more efficiently. As social and individual awareness concerning the limits of our fragile planet grows, innovations will be forced to create a technological and social infrastructure that helps us live meaningful lives."

According to these authors, two needs are stemming from the limitations observed in the old wave: 1) existing patterns of production and consumption in the 5th and previous K waves, and 2) an awareness of the innovative means.

2.3. Labour market transformation in the Smart City era

Although we did not find studies in the literature that analyse a labour market transformation for a Smart City public service systems deployment, in the following subsections, we discuss general studies of current labour market transformations in several countries (table 2). In this context, Ilich (2017, p. 179) suggests that:

Prospective labour market requires a skilled and responsible employee with high educational level and intelligence; creative, innovative and economic thinking; a high level of technical and technological culture; eagerness to adapt quickly to constant changes at the labour market; and an ability to accept and renew knowledge, technologies and ideas.

2.3.1. Actual labour market transformation in the United States

Frank et al. (2019) have presented an analysis of the transformation of the labour market in the United States. The continuous increase of automation occurs at a time of developing economic inequality, increasing fears of massive technologically induced unemployment and a renewed call for policy efforts to address the consequences of technological change. These authors examine the barriers (table 3) that restrain researchers from measuring

Table 2: Labour market transformation risk.

Labour market transformation context	Relevant risk
United States	About 47% of the whole employment in the United States are in the high-risk category (Frank et al., 2019).
Switzerland	The risk of being automated were performed by low-skilled employees (Balsmeier & Woerter, 2019).
Germany	15% of the work would not be disposed of due to the digital transformation because the automation probabilities only considered the technical feasibility (Dengler & Matthes, 2018).
Russia	Lack of relevant statistical information at the municipal level. The Federal Statistical Service of the Russian Federation impedes a more in-depth understanding (Antonov, 2019).

the impacts of Artificial Intelligence (AI) and automation in the future labour market, for example, the lack of high-quality data on the nature of future work, and deficient understanding of how technologies interact with broader economic dynamics and institutional mechanisms. For them, overcoming these barriers requires enhancements within the longitudinal and spatial data collection and examination process. These authors suggest the need to create tools that map the dependencies between skills and job requirements: machine learning (ML) and natural language processing (NLP) could help to capture the latent structure of any labour market transformation, in order to strengthen labour forecasts and the capacity of policymakers to reply to real-time labour trends in a given

territory.

On the other hand, Frey & Osborne (2017) analysed the transformation of the United States labour market from another perspective. For these authors, algorithms for massive data are presently rapidly entering domains that depended on design recognition and could easily replace work in a wide range of non-routine cognitive tasks. Their inquire about addresses the question of "how susceptible are current jobs to these technological developments?" They have performed a novel methodology to estimate the probability of computerisation for 702 occupations in the United States, distinguishing between tall, medium and low-risk occupations, depending on their probability of automation. According to their results, about 47% of the whole employment in the United States are in the high-risk category. Such occupations may be automated relatively soon, perhaps over the following decade or two. Their findings infer that, as technology progresses, low-skilled workers will perform tasks that are not susceptible to computerisation, that require inventive and social intelligence. In that context, for workers to win the race, they must procure creative and social skills. But, what about those who can't or what if everybody has the necessary skills?

2.3.2. Actual labour market transformation in Switzerland

Balsmeier & Woerter (2019) analysed the labour market in Switzerland in light of the current digitalisation of the workplace. These authors inquire how the adoption of new technologies influences the creation and destruction of jobs within the Swiss context. According to these authors, the tasks that run the risk of being automated were performed by low-skilled employees. In contrast, most of the new tasks that emerge from the adoption of digital technologies complemented the highly skilled workforce. These authors have shown that more significant investment in digitalisation is related to the higher employment of highly qualified workers and a decrease of low-skilled workers. For these researchers, this change was driven almost completely by companies that utilise machine-based digital technologies, i.e. robots or the Internet of things. Combined with a diminish in occupations for low-skilled workers, inequality within the population is likely to increase, which postures a critical challenge for

Table 3: Current barriers to estimate the future of work in the U.S. along with proposed solutions. Source: (Frank et al., 2019, p. 6534).

Barrier		Proposed solutions
Sparse data	skills	<ul style="list-style-type: none"> - Adaptive skill taxonomies - Connect susceptible skills to new technology - Improve the temporal resolution of data collection - Use data from career web platforms - Explore out-of-equilibrium dynamics
Limited modelling	modelling of resilience	<ul style="list-style-type: none"> - Identify workplace skill interdependencies - Connect skill relationships to worker mobility - Relate worker mobility to economic resilience in cities - Explore models of resilience from other academic domains - Labour dependencies between places (e.g. cities)
Places in isolation		<ul style="list-style-type: none"> - Identify skill sets of local economies - Identify the heterogeneous impact of technology across places - Use intercity connections to study national economic resilience

public institutions and policymakers.

2.3.3. Actual labour market transformation in Germany

Dengler & Matthes (2018) analysed for the first time the potentials for job replacement for Germany. This work transposes and improves the research of Frey and Osborne (2017) on the transformation of the current labour market from the United States to Germany. Unlike those authors, Dengler & Matthes (2018) assume that advances in computing could not replace a complete occupation, but only some tasks. In the German case, expecting that the whole professions are replaceable by computers or computer-controlled machines (occupancy level approach), they have obtained similar results to Frey & Osborne (2017): around 47% of the German representatives were working in a replaceable occupation in 2013. In any case, by applying a direct assessment, only some tasks can be supplanted by computers or computer-controlled machines according to programmable rules (task-based approach). In this context, they found that only 15% of the German employees were at risk of being supplanted by robotising. These authors argue that 15% of the work would not be disposed of due to the digital transformation because the automation probabilities only considered the technical feasibility. It is possible that these authors implicitly included the effect of the German welfare state as opposed to the study on the US, where social welfare is not a significant issue for policymakers. Also, they concluded that more research is required regarding the future development of employment. It needs to propose appropriate policies supporting an adjustment to technological

changes.

2.3.4. Actual labour market transformation in Russia

Antonov (2019) has presented an investigation of the main stages of labour markets' transformation in Russia. His research analyses for the first time the state of the work market of all cities in the country in a broad range of organisations based on information from the Federal Tax Service (FTS). For this author, since 2010, there had been a transformative process of redistribution of labour resources between primary, secondary and tertiary sectors in the cities of Russia. This author argues that the transformation processes of local labour markets were challenging to investigate due to deficient or lacking data quality, as also noted by Frank et al. (2019). Both works point out that the monitoring and analysis of the state of the labour market in cities require the development of new tools. In the Russian case, the lack of relevant statistical information at the municipal level on the labour markets of the Federal Statistical Service of the Russian Federation impedes a more in-depth understanding. The financial statistics of the Federal Fiscal Service of the Russian Federation remain the only source of information covering all territories.

3. Method

Research on change or transformation is useful for theory and practice because it must explore contexts, content and processes as well as their interactions over time

(Musca, 2006, p. 153). Data was collected through recruitment interviews, fairs, and job search platforms. This data collection allowed us to observe, interact with the set of actors, “speak” the same language, and decipher how members of the urban service ecosystem are becoming smart to understand the reality of the phenomenon studied (Weick, 1995). The participation in these events allowed us to collect data as well as to distinguish the specificity of the transformation of the labour market in the context of an urban service system becoming smart.

3.1. Qualitative data collection

3.1.1. Job interview and career fair data collection

Data collection was performed between June 2018–August 2019). It was mostly dependent on the "Smart City" job offers or career fairs that took place during this period. The platforms were: *LinkedIn*, *Emploi Public* and *Pôle Emploi*. In this way, the first author was able to apply for various job offers in both the public and private sectors.

Table 4: Data collection on job interviews.

Sector	Conducted job interviews
Public	11
Private	7

In-depth job interviews were conducted for several Smart City recruitment processes, either in person, via phone, or over Skype. Each meeting took between 15 and 90 minutes. The first three interviews were open. Questions were purposefully open-ended to guide the general discussion and allow for follow-up questions. We began by asking about their career trajectory and exploring the LinkedIn profile of job interviewers. Afterwards, a semi-structured interview protocol was created to distinguish the degree of maturity of the Smart City project, the skills, and the number of people comprising the work team as well as to avoid "showcase projects".

3.1.2. Data analysis

As shown in Figure 1, we analysed the data by looking for common themes using an inductive approach (Gioia et al., 2013). The process of interpreting empirical data allowed for the highlighting of relationships between theories, concepts and empirical data. The first-order codes

were grouped through more theoretical perceptions (theoretical categories). Then, we condensed the theoretical categories into more general dimensions (aggregate dimensions).

4. Preliminary results and discussion

In this article, we have tried to provide an initial response to the call of Frank et al. (2019). These authors pointed to the need to create tools that map the dependencies between skills and job requirements through machine learning and natural language processing to capture the latent structure of the labour market. There are some technical challenges. As noted by Frank et al. (2019) and Antonov (2019), the processes of transformation of local labour markets are challenging to investigate due to incomplete or deficient data quality. The data showed us an increment in the quantity of jobs offers for the implementation of smart services systems in the context of Smart City initiatives. As highlighted by Dengler & Matthes (2018), it needs to propose appropriate policies supporting the adjustment of the labour market to technological changes. In this context, based on our data, we agree with Balsmeier & Woerter (2019) that a decrease in jobs for low-skilled workers and an increase of inequality within the population is likely to occur, which poses a significant challenge for public institutions and policymakers. Nevertheless, in the case of French public organisations, very demanding and poorly paid job offers indicate a possible misunderstanding of the different roles in data-driven technical works. The co-creation process of smart urban service systems (e.g. complex service system, adaptive service system, multi-level service system, human-centred service system, product-service system, smart service system) driven by individual service logic (e.g. customer-dominant logic of service (Heinonen et al., 2010), customer and employee logics (Kingman-Brundage et al., 1995)) allows defining the technical specifications. Smart urban service systems need the hybridisation or combination of several individuals and collective service logics (e.g. goods-dominant logic (Mont, 2002; Manzini & Vezzoli, 2003; Vargo & Lusch, 2004; Tukker, 2004; Miles, 2008), public service logic (Osborne et al., 2015; Osborne, 2018), service-dominant logic of the market (Vargo

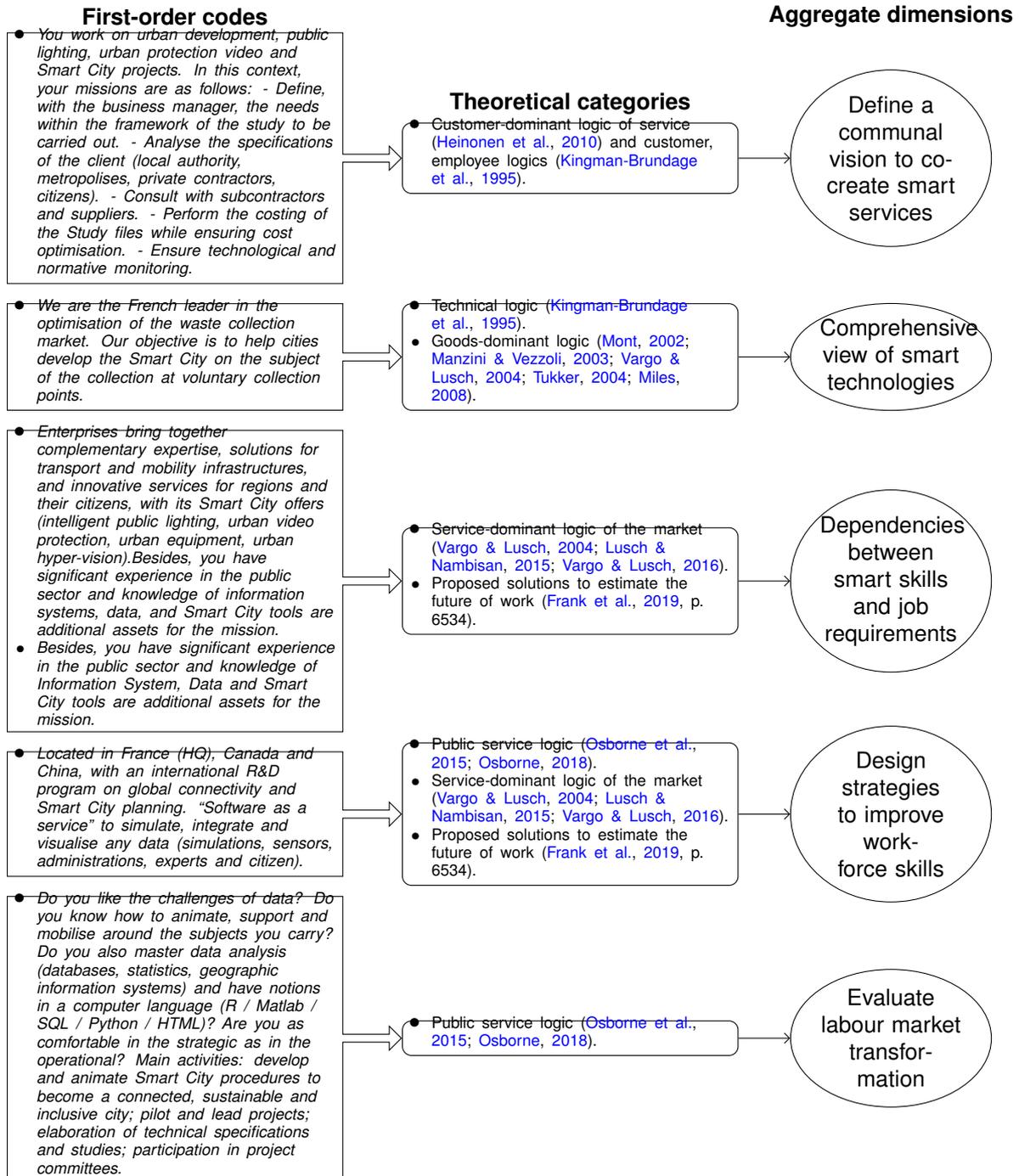


Figure 1: Data structure analysis

Table 5: Data collection on career fairs.

Career fair	Date	Place	Career fair description
PhDTalent Career Fair 2018	October 5, 2018, from 09:00 to 18:00	Le CENTQUATRE-Paris	PhDTalent Career Fair is the largest career fair dedicated to PhDs in Europe. In 2018, for its seventh edition, 120 companies were present to recruit PhDs regardless of their discipline.
DataJob 2018	November 22, 2018, from 9:00 to 19:00	Le Carrousel du Louvre Paris	DataJob is a meeting room of data specialist trades, dedicated to artificial intelligence and data profiles.
Salon de la data	September 10, 2019 from 9:00 to 19:00	Cité des Congrès, Nantes	The show is aimed at any data professional who is a decision-maker, expert, or user, be they private or public. The goal is to provide feedback and relevant information on current advances to democratise the various uses and challenges of data.

& Lusch, 2004; Lusch & Nambisan, 2015; Vargo & Lusch, 2016), and technical logic (Kingman-Brundage et al., 1995)). From the interview data, it can be seen that by far the greatest demand is for high-level technical skills. On the other hand, French public administrations generally do not have an internal technical development team. In this sense, some small public structures accustomed to technical outsourcing skills might think that hiring one or two people with technical skills is enough to develop and deploy a public service as shows:

The Direction of Digital Planning is a small structure of 4 [non-technical skilled] people where you will have the opportunity to participate in various projects.

The Digital Department offers a position to enable you to carry out innovative projects, in a current context marked by the creation of the new commune Y. It supports all of the business departments in their approach to developing tools, dematerialisation and optimisation of their processes.

5. Highlighting the french labour market transformation in smart cities era expansion: service systems transformation and job skills policy development for service industries

The present article aims to examine how the actual labour market transformation concerning territorial ser-

vice system becoming 'smart' be highlighted? What knowledge, skills, abilities and roles are needed to contribute to service system's transformation and job skills policy development for services industries? From our preliminary data analysis (Figure 1), we propose a prospective framework (Figure 2) to forecasting the labour market transformation in the current smart cities and smart territories era expansion. A medium and long-term perspective forecast, this French labour market transformation in the smart cities era expansion needs to solve a piece of a giant puzzle that involves several research fields and service sectors as culture, tourism, transport and health.

5.1. Define a communal vision to co-create smart services according to territory needs

A smart service system is a complex set of interoperable data and digital public service sub-systems (e.g. health, education, mobility and transport, employment, urban resilience, culture, tourism, sport, leisure). Policymakers have to lead the definition of a shared vision adapted from the given territorial context and citizens' needs in terms of smart services. It is essential to take into account the needs of citizens/users in line with a customer-dominant logic of service (Heinonen et al., 2010) or customer/employee logics (Kingman-Brundage et al., 1995). In this way, we have seen that the point of view of institutional logics (Thornton et al., 2012) conceptualises society as an interinstitutional system in which logics are characterised by social-cultural differentiation, fracture and in-

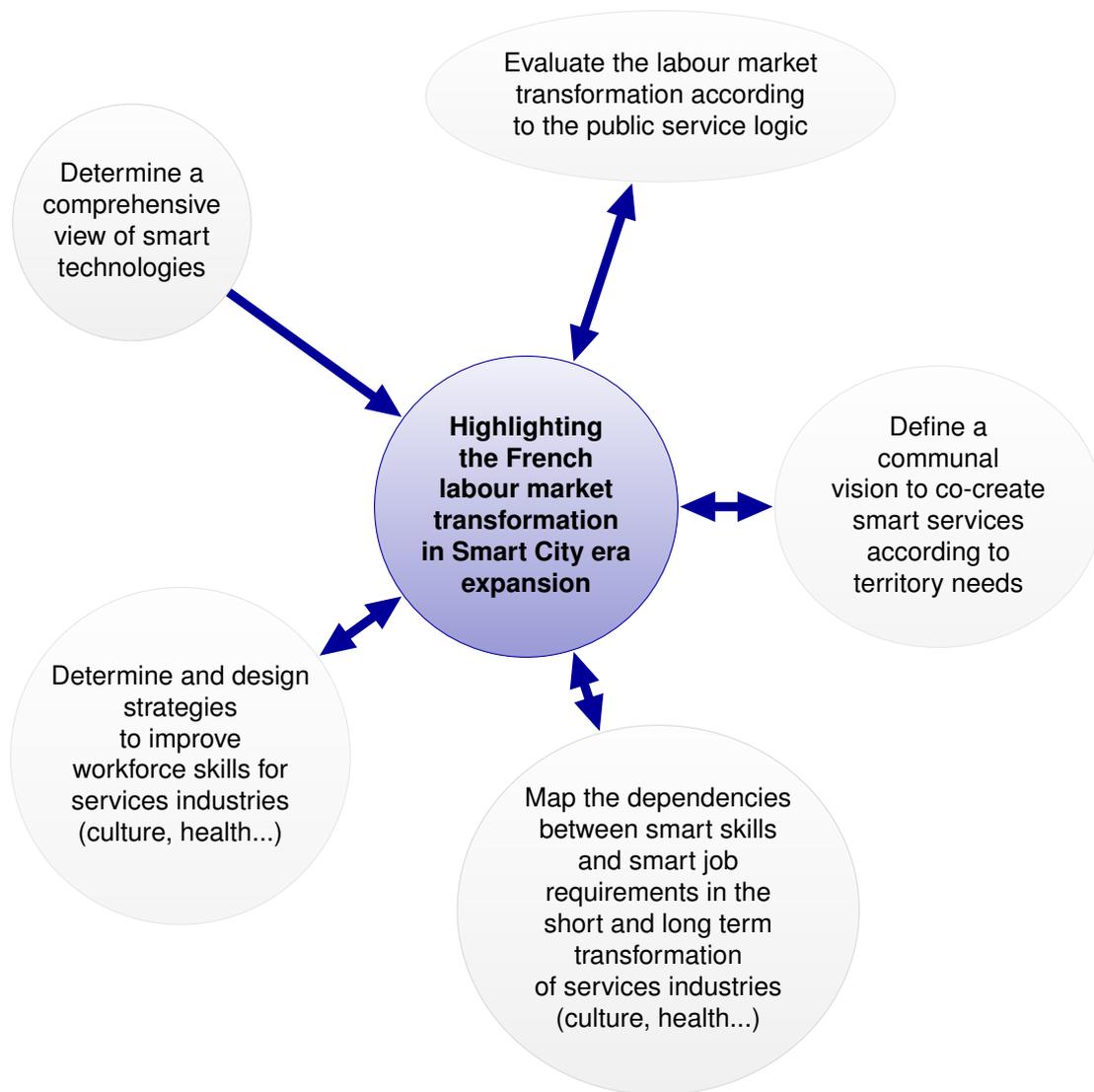


Figure 2: Towards highlighting the French labour market transformation in Smart City era to a service systems transformation and job skills policy development for services industries (culture, tourism, health, transport...).

consistency. As detailed by [Thornton & Ocasio \(2008, p. 119\)](#), institutional logics do not rise from organisational fields if not from interinstitutional systems, instantiated and adopted in organisational fields, markets, industries and public or private organisations. The perspective of institutional logics is a meta-theoretical framework for examining the interrelationships between institutions, people and organisations in social systems ([Thornton et al., 2012, p. 2](#)). As pointed out by [Thornton & Ocasio \(2008\)](#), four dimensions common to all institutional logics are 1) sources of collective identity; 2) determinants of power and status; 3) social classification and categorisation systems, and 4) the allocation of attention. Although the dimensionality of institutional logics is at the centre of the perspective, they remain provisional; that is, the particular dimensions that are relevant to different contexts or empirical studies may vary. It is up to individual researchers to justify the existence of logics and their relevant dimensions in the context of a study.

5.2. Determine a comprehensive view of smart technologies for services industries (culture, health...)

Smart service systems are based on traditional ICT and emerging smart technologies such as Big Data, open data and IoT. In this sense, an adaptive service system is sensitive to the context and geographical position. Public co-creation spaces such as Fab labs (i.e. experimentation spaces) could be used to explain the different technologies to citizens. The verbatims below illustrate some of the main characteristics of the job and kind of smart service system to co-create:

Data, as for the economic sector, is a significant challenge for the territories to improve, design services for citizens, facilitate, simplify public services and strengthen citizens' confidence in public action. It will be a question of bringing expertise on the data in the implementation of the digital strategy of Community of Agglomeration X. The stake will also be to animate the mutualised data within the inter-municipal structure and the 23 communes. We imagine and carry innovative partnerships around data, the connected city and artificial

intelligence in connection with the skills of the agglomeration and the municipalities.

The Community of Agglomeration X was born from the union of several communities. We are currently looking for a digital project manager. You will intervene in all subjects around digital policy and innovation: public data, Smart City and digital uses. You will also be in charge of the administration of our open data platform.

Aligned to a technical logic ([Kingman-Brundage et al., 1995](#)) or a goods-dominant logic ([Mont, 2002](#); [Manzini & Vezzoli, 2003](#); [Vargo & Lusch, 2004](#); [Tukker, 2004](#); [Miles, 2008](#)), it is essential to make technology forecasting by studying the implications in the medium and long term from an ethic and societal point of view of the technology adopted.

5.3. Map the dependencies between smart skills and job requirements in the short and long term transformation of services industries (culture, health...)

As technology and institutional orders change, institutions at other levels change, and so do the different institutional logics associated with them. The institutional logics are historically contingent and evolve over time, both at the level of the institutional orders of society, as well as at other levels of analysis. According to [Hietanen et al. \(2017\)](#), the SDL represents a tacit neo-liberalism of capitalist ideology, including broader perspectives of "markets" as networks of interactions, or "as complex configurations and systems". Also, these authors pointed out that these concepts, stemming from institutional theory, the theory of practice and the actors' theorem, presently permit SDL to consider institutions - rules, standards, meanings, symbols, practices and collaboration and, more generally, institutional arrangements, focused on economic value.

A smart service system is based on collective service logics of general interest for individual logics for the creation of public, social and sustainable value related to inhabitants' well-being and their environmental impacts at the local, national and global levels in both the short and the long term. It is necessary to create tools that map the dependencies between skills and job requirements

through ML and NLP to capture the latent structure of the labour market (Frank et al., 2019) as technology and institutional orders change.

5.4. Design strategies to improve workforce skills

Smart service system co-creation can focus on changes in the behavioural patterns of users and institutions through social innovation. The deployment of initiatives integrates a transformational process of institutional arrangements (e.g. standards, rules, APIs) and implements a public urban multiservice platform. It is necessary to combine various resources and strategies to anticipate a public service system transformation of the labour market in the short, medium and long term, identifying future talent gaps and social exclusion problems. Through cooperation between actors via the public service logic (Osborne et al., 2015; Osborne, 2018) and the service-dominant logic of the market (Vargo & Lusch, 2004; Lusch & Nambisan, 2015; Vargo & Lusch, 2016), solutions can be proposed to estimate the future of work (Frank et al., 2019, p. 6534).

5.5. Evaluate the labour market transformation according to public service and sustainable logic

It is necessary to evaluate periodically to put into practice strategies that weakened any kind of discrimination and progress towards the resolution of social and environmental problems, according to the Smart City objectives. In this sense, the public service logic (Osborne et al., 2015; Osborne, 2018) may contribute to improving our understanding of sustainable and public value co-creation.

6. Conclusion

The results of this research support the idea that Dengler & Matthes (2018) and Balsmeier & Woerter (2019), we need more research and solutions regarding the future development of employment to create appropriate policies to support the adjustment to technological changes. Also, this research contributes to the neo-Schumpeterian longitudinal research of Silva-Morales (2017) in a French context. Emerging smart services are associated with higher degrees of employment of highly qualified workers and a reduction of (opportunities for) low-skilled workers.

We need to take into account needs and characteristics, as much as possible, of citizens vulnerable to exclusion from the labour market and the workforce.

This work contributes to the existing knowledge of labour market transformation analysis. Developing and implementing a workforce inclusiveness strategy that guarantees access to the workforce will determine successful long-term Smart City road-map strategies. The same technology could allow us to avoid future catastrophic scenarios where a decrease in employment for low-skilled workers intensifies inequality within the population. Inclusive smart services co-creation poses a significant challenge for services industries (art, culture, health...), public institutions, policymakers, data science, Smart City and service design research.

7. Future work

In order to identify relevant topics of French labour market transformation, future quantitative research can scrape data from job platforms such as *Emploi Public*, *LinkedIn* and *Pôle Emploi*, for analyse new jobs in services industries (art, culture, tourism, ...) through ML, deep learning and text mining analysis. Also, other researchers will be able to study whether the current COVID-19 pandemic accelerates the whole process of labour market transformation, just as the social fallout. Consequently, it is necessary to take into account the needs, characteristics, job skills and data sources of citizens that are vulnerable to exclusion from the labour market in a post-pandemic context that increases artificial intelligence-based services.

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