

Commitment and Trust

Fostering Socio-economic Development Through Voluntary Data Exchange Between Governmental and Commercial Entities

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Commitment and Trust: Fostering Socio-Economic Development Through Voluntary Data Exchange Between Governmental and Commercial Entities

Abstract

Purpose – This paper presents the results of a project deployment on voluntary data exchange between a municipality and commercial entities built on the Commitment-Trust theory. The research also discovers whether data sharing can be a vital instrument to foster city socio-economic development.

Design/methodology/approach – Inspired by the engaged scholarship approach, our research explores the economic and operational results of data integration from two different information sources, the legislation impact, and the effects on citizens as final beneficiaries. Over a period of 27 months, we observed changes the voluntary data sharing brings in traditional interaction between multiple ecosystems. The impact of positive and negative factors was validated via 12 exit interviews with key stakeholders.

Findings – Voluntary data sharing is driven by parties' goodwill to improve public services for residents, the organisations gain tremendously much more benefits than they can do separately on their own. When the parties commit to voluntarily share data, this increases trust in each other and the responsibility of each data contributor. Our research proposes that the Commitment-Trust theory is well-replicable for the Government-to-Business relationship.

Originality/value – Our research contributes to the current body of knowledge of voluntary data exchange between different ecosystems, especially between a government and its environment. We present a relevant project deployment from an emerging economy and its consequences for a city municipality, businesses, and residents.

Paper type – Case study.

Keywords: voluntary data exchange, data integration, government-to-business relationship, commitment-trust theory, engaged scholarship, city development, multiple ecosystems.

1. Introduction

Today's cities have to learn to identify new and smart ways to manage the complexity of urban living, and problems ranging from pollution and overcrowding to high unemployment, infrastructure provision, and others (Sarkar, 2021). Public authorities are challenged to boost urban citizens' quality of life and, at the same time, reduce the contradiction between growing demand and lagging supply in different functionalities. There is also a stress between the existence of a previously organised city, and the need to be reorganised in another way to become a smart city (Bolívar *et al.*, 2023).

Almaty city also aims to combine the desire to be a modern and sustainable city and the need to modernise aging infrastructures and improve service provision to city residents. One objective of Almaty, being the biggest economic centre of Kazakhstan, is to continue to drive the economic growth of the country while also providing her constituents with a high standard of living.

Almaty with its official population of over 2 million residents is the centre of attraction for people from Central Asia and other post-Soviet countries. The city makes almost 20% of the national GDP, its residents have a high IT-literacy rate. Almaty municipality estimates that 3 out of 5 new Almaty residents are newcomers, and more than 400 thousand people commute to and from the city on an everyday basis. This requires comprehensive management of migration processes, provision of sustainable power and water supply, and equal access of all citizens to necessary public services and employment opportunities. The municipality performs 807 functions in 22 areas of city operations, which are regulated by 710 legal acts. Data about various aspects of city life is stored in 80 siloed information systems with limited ability to combine and share data (Almaty Municipality, 2022).

Like many other megapolises (Olaniyi *et al.*, 2023), Almaty municipality intends to make data-driven decisions based on big data analytics. This means the primary need to understand the city data – in terms of valuable data sources and its affiliation to the public or private sector. Then based on the data, identify the needs of city residents, the strains on its infrastructure, and the strains on its social services. If all data can be effectively harnessed and securely made available for sharing, the agencies in Almaty can use them not only to deliver better products and services to serve its residents but also to gain insights to formulate better policies and strategies to govern the city in the digital economy.

Despite a city's intentions, there is always a gap between a strategy and its implementation, especially in emerging areas such as city data management. To bridge the gap, a research project deployment on voluntary data exchange was proposed to Almaty city Department of Digitalization, to reach the city's ambitions on data usage for improvement of socio-economic results.

In this research, an open-system approach and The Commitment-Trust theory were used to set up voluntary data exchange between governmental agencies and commercial entities. Within the engaged scholarship research framework, a pilot project was conducted from October 2020 to December 2022, with a focus on data integration from one governmental and one commercial source. The primary objective was to improve the collection of payments for communal utilities. Further, use the pilot study to showcase the value of data integration in healthcare, education, and social protection. By doing this, we aim to conceptualise how the relationship between

government and society can be enhanced through voluntary data exchange for the mutual benefit of the parties involved.

Specifically, this paper explores the following research questions:

1) What are the motives for governmental agencies and commercial companies to voluntarily exchange their data and trust each other?

2) How can data exchange and integration improve city development?

2. Prior research

To understand why a government decides to share its data, it is important to refresh the development phases of e-government and the principles of general systems theory.

Alongside the growth of info-communication technologies, scholars have proposed different e-government development models, comprising several consecutive stages (Layne and Lee, 2001; Moon, 2002; Andersen and Henriksen, 2006; Lee, 2010; Valdés *et al.*, 2011; Sandoval-Almazán *et al.*, 2017; Janowski, 2015; Sangki, 2018). The models differ in their purposes, number of stages, and theoretical grounds. However, as noted by Debrí and Bannister, many of the models' initial stages had been observed empirically, but the later stages are still aspirational (Debrí and Bannister, 2015). Thus, we refer to Gartner's four-phase model, as we believe it employs both technology capabilities and public administration reality and perspectives.

In the first stage there is a focus on 'digital presence' or, in other words, providing citizens access to digital forms of government-approved information (laws, orders, official announcements). The second stage allows simple interaction between public bodies and society in the form of email responses, government blogs, and citizens' comments. The third stage is characterised by the availability of online services such as licensing, permit applications, and tax payments. The following fourth stage comes when a government grows to the level of readiness to share with its public some governing functions through participatory budgets, selective contribution to decision-making, and financing society-driven projects (Baum and Di Maio, 2000).

Sharing governmental data with the environment belongs to the highest stage of e-government maturity, also called 'transformational government' (Chun *et al.*, 2010). 'Transformational' in this context signals that a closed institutional system as the traditional government evolves into an open system. By providing the public with access to previously closed 'internal-only' information, the government acknowledges the society as the equal partner, not as the governed object only. If this is the case, civic society becomes a part of the data processing and management system. On top of that, the society generates its data that can enrich governmental data and give a new interpretation to available official datasets. The exchange enhances existing

government-society interrelations and boosts government transformation towards an open system.

This process confirms Ludwig von Bertalanffy's general systems theory, which considers any organisation as a living organism, where a change of any element brings a change in a whole system (Bertalanffy, 1968). In our case, the change in the government organism brought about by data sharing, moves the government and the society to a higher level - level of trust. According to Davies et al., opportunities are open to building trust at multiple levels, from national to hyperlocal, especially after the COVID-19 pandemic (Davies *et al.*, 2021).

The UN E-Government Survey says that "digital development is inexorable, and inaction or the wrong action can be costly (in terms of missed economic and social development opportunities) and deepen risks (in particular those linked to cybersecurity and privacy issues)". Governmental digital efforts should be set up in a way that strengthens rather than undermines trust in governments and public institutions (United Nations Department of Economic and Social Affairs, 2022).

Municipal governments, by nature of their activities, should be aimed at open-system model operations as they are mandated to interact with local businesses, different civil groups, and individual citizens. However, municipalities are often stretched by national laws and assigned functionality, as well as by the fear of changing the situation. In this regard, we believe that new approaches to data management should lead to a better understanding of what processes can be changed to enable evolutionary development towards open-system transformational government.

While analysing modern scholarly research on data manipulation and usage, we outline several areas to be addressed to understand the issue. First of all, to enable dataflow exchange between information systems from different data owners, there is a need for interoperability frameworks that can provide technical and legislation baseline (Gil-Garcia and Sayogo, 2016). The problem of 'information silos', especially in the public sector, is well-known and covered for years in scholarly literature. According to Lehtimaki *et al.*, each department in city administration is siloed to defend its interests, conventional mindset, and budgetary status quo (Lehtimaki *et al.*, 2023). Silos are 'invisible barriers', by keeping out those who are 'not like us' (Cilliers and Greyvenstein, 2012). As a result, fragmenting information by verticals provokes the lack of cross-domain data mixture to provide added-value services (Hernández *et al.*, 2023).

Data is the 'must' component of digital transformation, yet many organisations inhibit access to data, preserving data silos. Civil servants can foster or limit the opening of data - some might adhere more to the idea of opening data, whereas others might have a risk-averse attitude to avoid any claims at a later stage (Kleiman *et al.*, 2023).

In recent years there has been an increase in publications about cross-departmental and intra-organisational sharing in the public sector (Dong *et al.*, 2023; Hasche *et al.*, 2020) and in

private companies (Karhapaa *et al.*, 2022). There are studies on cross-sectoral transformation, but mostly in a specific sector as healthcare (Parks *et al.*, 2019), agri-culture (Durrant *et al.*, 2022; Qian *et al.*, 2023), transportation, energy, and telecommunication (Sonesson *et al.*, 2021). There are proposals for creating digital platforms for cross-sectoral collaboration in the circular economy (Soldatos *et al.*, 2019), a framework for voluntary Business-to-Government information sharing (Rukanova *et al.*, 2020), a blockchain-enabled platform to ensure data transaction transparency (Rukanova *et al.*, 2023), and different partnership models in cross-sector data-sharing (Susha *et al.*, 2023). Promising case studies on data sharing are published by the Royal Academy of Engineering, including developments for industrial data space and individual data sharing (Royal Academy of Engineering, 2023). The Singapore government has probably stepped further than anyone else by introducing the Trusted Data Sharing Framework, which includes strategy, legal and technical considerations, and operational issues of data sharing (Infocomm Media Development Authority, 2019). However, there is still a lack of evidence of real project deployments on voluntary data sharing between different ecosystems.

Secondly, scholarly literature suggests that governments should not overestimate the power of technology; among the most common delusions are the belief that as much government publishes data the better, or anybody can easily use data, or opening data automatically means open government (Janssen *et al.*, 2012). In fact, in the process of deployment of data projects, governments need to overcome behavioural and organisational barriers (Berntzen *et al.*, 2019), among those we would like to draw attention to the neglect of opportunities, conflicting values, risk-averse culture, and questionable quality of user input.

Thirdly, there should be a cohort of enthusiasts ready to consume data for co-creation or co-production purposes (Lember *et al.*, 2019; Scupola and Mergel, 2022; Akter *et al.*, 2022; Allen and Cho, 2020). In some research papers, such enthusiasts have been also named as data collaboratives (Ruijter, 2021; Susha and Gil-Garcia, 2019). Examples from the research literature on data use and re-use by both state and society include cases of particular initiatives at the municipality level, where traditionally data management is considered to be the most powerful. In San Francisco, restaurant inspections publish their results on the city website, allowing citizens to see health and hygiene scores alongside restaurant public reviews and ratings (Mergel *et al.*, 2018). In Chicago, researchers motivated stakeholders to use available datasets for predictive analytics in food inspection (McBride *et al.*, 2019).

With understanding and accepting different assessments and experiences, we hold to the view that the opening of governmental data indicates a change in the relationship between government and its environment and, consequently, points to transformation from a closed governmental system to an open system. We agree with Jackson that opening a system typically “requires a shift from mechanistic control to an evolutionary perspective and that new governance

mechanisms, capabilities and processes are necessary for dealing with feedback loops” (Jackson, 2003).

The notion of feedback is important in open systems as it reflects the change in one element which consequently causes changes in the whole system. In terms of data governance, the feedback means the interest in datasets provided, and the potential for data modification and re-use by businesses and wider society – that should be counted in new services, new data-driven businesses, etc.

Re-use of data is now considered as the driving force for progressive economics as it creates added value to products, services, and content enabled by data sharing. The study from Deloitte shows that economic impact can be made by just one dataset (Deloitte, 2012). However, according to OECD, in 2019 only 2.1% of firms with more than 250 employees were selling data, and only 4.6% purchased data, and the percentages were lower for smaller firms (Organization for Economic Co-operation and Development, 2022).

Open Data Institute runs a series of research to understand the potential benefits of data for societies and economies. The organisation advocates for trustworthy data stewardship in the form of data trusts (Open Data Institute, 2019). Instead of treating data as a tradeable good, it may be more productive to conceptualise it as a collective resource and focus on arrangements to regulate access and use (Open Data Institute, 2023).

Among scholars, one group of researchers proposes ‘data trust as-a-service’ for multi-party data sharing (Lomotey *et al.*, 2022). Another group suggests creating initial data trust environment, with at least one publisher and one user; and then developing more complex value-added services (Stachon *et al.*, 2023). The research interest is on the rise, assigning data trusts with different roles - from data custodian to data broker.

Still, we identified that the niche of voluntary data sharing and exchange is underexplored, especially in Government-to-Business relationships. Our research aims to contribute to the current body of knowledge by presenting the Almaty city experience.

There is a need to correctly understand definitions related to data manipulations such as ‘data exchange’ and ‘data sharing’. In the context of our research, they are similar terms, because “data sharing exchange happens when any organisation or individual can use any counterparty's data and metadata (assuming they are permitted access to it).” (Statistical Data and Meta eXchange, 2020).

3. Research design and data collection

We fully agree with Peter W.G. Morris:

“Projects are vehicles for achieving change, for addressing needs. But how often does our research reach beyond process, people and technology and work on the way we tackle the issues themselves? The domain, and our work in it, should be practically relevant and useful” (Morris, 2010).

Thus, in our research, we apply an *engaged scholarship* approach, which allows the usage of academic knowledge not only *for* practice but *with* practitioners, to research a complex phenomenon and provide its practical application (Van de Ven, 2018). To achieve that, we used observations and interviews, for primary source data collection between 2020 and 2022. Alongside project development, we actively studied secondary sources to understand others' experiences while facing a particular problem (scholarly literature, government and industry reports).

Van de Ven outlines four key stages in engaged scholarship that we interpret as corresponding stages of the project cycle:

1) *Problem formulation* as an initial situation analysis to identify practical and research problems. In our case, we conducted 19 initial meetings with municipality representatives to understand on-the-ground situation of existing data and data flow between different information systems. The interviews were organised as inter-departmental working meetings, notes were summarised and submitted to the project sponsor as the initial situational analysis on city data management.

2) Contribution to *theory building* – testing an existing theory in a new context reality. We took The Commitment-Trust theory (CT) that was developed for Business-to-Business (B-2-B) relationship marketing and tested it in the Government-to-Business (G-2-B) context. Our propositions are:

IF: CT is proven to work in a B-2-B environment (Morgan and Hunt, 1994);

AND: Almaty city government intends to interact with its environment more openly and business-like (Almaty city Department of Digitalization, 2020);

AND: Data in question is the subject of interest for the parties involved;

AND: Relevant data exchange technology is in place;

THEN: CT should work in a G-2-B environment.

3) After the initial meetings, we followed the *development process research model* to observe “how things change and develop over time” (Van de Ven, 2007). We participated in major regular working meetings for 27 months, to monitor change in peoples' attitude, and ability to reach agreement and follow it in actual implementation. Observations from the meetings were documented in field notes. Also, we conducted exit interviews after the meetings with key stakeholders who were involved in project implementation. In the semi-structured exit interviews, questions covered all major aspects of the CT theory, both positive and negative features, to incorporate reflections of changes over the pilot project development. We also aimed to understand whether participants' expectations were met and what new areas arose that should be addressed during further full-fledged project implementation. We ran twelve qualitative interviews, that included three informants from each of the four organisations: top management (vision and strategy), middle (operational) management, and technical level (technical execution). The field

notes and transcripts of the 300 minutes of recorded interviews were open-ended coded with the NVivo software. The interviewees were coded as follows (Table I):

Table I

Overview of informants: project implementation

Organisation profile	Top manager (Decision-maker level)	Middle-level manager (Operational level)	Executor (Implementation level)
Project sponsor	A1	A2	A3
Technology provider	B1	B2	B3
Government data custodian	C1	C2	C3
Utility data custodian	D1	D2	D3

Source: Created by authors

4) In line with the engaged scholarship approach, we formulated suggestions for meaningful *problem solving* in the implementation phase of a pilot project in a G-2-B environment and tested the hypothesis of a voluntary data exchange between the state and society. During the implementation phase we used field notes to document our observations on the economic and operational results of data integration; the legislation impact; and the effects on citizens as final beneficiaries.

4. Results

This section reflects the project implementation stages in chronological order. It covers both practical results and theory testing, as they are closely interconnected.

4.1. Situation analysis on city data management

In Kazakhstan, pools of most critical data (health, education, social protection) are not fully available for a municipality, because data is being entered into national databases, bypassing the city level. However, at the city level, we need to comprehend the data and how it can be used to foster socio-economic development. For Almaty city, where more than 10% of the national population live, work, and study, it is crucial to understand its residents, who represent different social groups.

The second challenge that was identified to be addressed, is the need to change data flow between municipal structural divisions from vertical to cross-sectoral. Analysis of current processes revealed duplication in the collection of information (different forms are filled out with

almost identical information for different ministries). With such a vertical approach, information gaps are also inevitable – for example, it is now impossible to determine the employment of college and university graduates, because the data are scattered across different ministries (Darmenova *et al.*, 2020).

Thirdly, some data owners are not obliged or cannot transfer the collected data to the municipality (utility providers, insurance companies, etc.). The process of obtaining partial information is quite long, through official requests, even between the supervising department and the data owner. A lot of man-hours are spent on both sides; it is impossible to get up-to-date data in real time.

After meetings and discussions with municipality representatives, we suggested that work with city-level data should start around ‘a resident and his environment’ – the so-called Social cluster. Data contributors should represent Almaty city structural departments and commercial companies willing to make changes to city life and enhance their own data-driven decisions. The project sponsor decided to run a pilot project as a ‘proof-of-concept’ of a new approach to city data management.

4.2. The pilot project selection

Almaty city population has significantly grown from 2008 to 2021 (1,287 million to 2,025 million people), when additional territories were attached, with the formation of two new administrative districts. To this jump in the population, it is necessary to add a natural increase due to the birth rate and internal migrants, and the abolition of paper verifications in 2019. As commercial entities, communal utilities do not have access to national databases on the population’s internal migration. That means the providers can update their databases with the number of people living at a particular address when a property owner decides to provide such an information. All these reasons have led to the fact that databases of utility providers do not reflect the real number of living residents, some of whom may not even have registration in the city, but at the same time might be active consumers of utilities.

Together with utility providers, we ran an analysis of the amounts of utility payments for the first half of 2020, comparing the payments with the number of registered residents in different administrative districts of the city. We found out that the number of registered residents in old district A is only 30% more, but the number of payments is 15 times higher than in new district B. Thus, we assumed that many more people use utilities in the new district B than are recorded in the databases of utility providers. Understanding real numbers became the driving force for utility providers to participate in the pilot project of data sharing.

The primary purpose for the pilot project was identified as to improve the collection of payments for communal utilities through data sharing between one governmental and one

commercial database – and use this success to showcase the value of data integration for healthcare, education, and social protection.

4.3. Theory testing

Despite the government needing to share full or partial data with the environment, the question remains: why would a state body or a commercial company voluntarily share its data? To address it, we refer to the Commitment-Trust theory as a guide to building the mechanism for cooperative data exchange. Though the theory covers relationship marketing for commercial companies solely, we apply it to a Government-to-Business relationship, because we believe that modern public administration assumes more business approaches as project-based management, agility, and digital ambidexterity, rather than traditional coercive power that “conditions others” (Thorelli, 1986). The theory authors assert that the exercise of power based on dependence can lead to temporary participants’ acquiescence. In the long term, this approach “destroys trust and commitment” and consequently decreases cooperation and inhibits success (Morgan and Hunt, 1994). We strongly agree that coercive power cannot be the central construct when we want to build a successful relationship based on trust between the public and business sectors. However, we consider the state power as an enabler for creating a commitment-trust mechanism, by encouraging participation from public bodies and providing legislation and a financial basis to start off-the-ground.

In the pilot project, we focused on elements that positively influence ‘Trust’ and ‘Relationship Commitment’ and lead to successful ‘Cooperation’, which in our case is equal to the desired project results. According to the CT theory, these elements are ‘Relationship Termination Costs’, ‘Relationship Benefits’, ‘Shared Values’, and ‘Communication’ (Fig. 1).

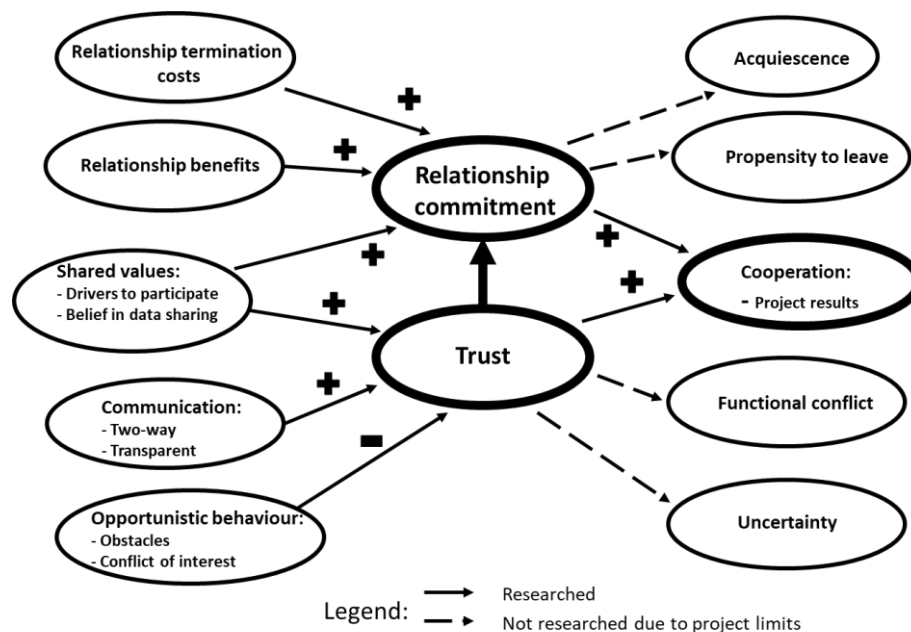


Fig 1. The Commitment-Trust theory for voluntary data sharing projects.

Adopted from Morgan and Hunt, 1994, p.22

We understood that from the project management point of view, we can influence ‘Relationship Benefits’ and ‘Communication’, by forming clear key performance indicators (KPIs), timelines, roles and responsibilities, and by building transparent two-way communication to quickly address disagreements and other emerging issues. However, participants could have their expectations from the project and its benefits in particular, therefore we asked them in exit interviews whether expectations were met. Despite attractive benefits and clear communication, we accepted that we cannot control ‘Termination Costs’, because each participating organisation would calculate it from their perspective, including external factors beyond the scope of the project. We also recognised that we cannot influence ‘Shared Values’, even in a pilot project with a limited number of participants and one common purpose. But ‘Shared Values’ affect both ‘Trust’ and ‘Commitment’, thus our research task was determined to observe whether shared values were present at the start of the project and, if not, whether they emerged between participants during the project deployment. We identified possible elements of shared values as ‘drivers to participate in the project’ and ‘belief in voluntary data exchange’.

We zoomed in ‘Opportunistic Behaviour’ as a negative contributor to ‘Trust’, and specified possible reasons for such behaviour as ‘obstacles met during project deployment’ and ‘conflict of interests’. Obstacles we addressed with agile management; conflict of interest was minimised by the pilot project framework which is essentially an artificial experimental environment in many ways. For setting up a balanced ecosystem, we also agreed with the project sponsor to avoid the usage of ‘coercive power’ as much as possible during the project implementation.

Due to project limitations in the number of participants and timeframe, we did not research variables that are dependent on ‘Commitment’ and ‘Trust’, except ‘Cooperation’ – which we consider as direct project results.

4.4. Introducing a new type of G-2-B relations

It should be noted that municipal digital infrastructures are designed in the traditional way of a closed institutional system, obstructing cross-sectoral interaction of governmental data with external data. Therefore, to implement the project, it was necessary to change the ‘rules of the game’ by setting up a new digital relationship between the municipality and its environment.

Another important circumstance was that the project started during the pandemic period when all participants were able to meet virtually only, which was unusual for the local team.

We approached the challenges by introducing a discovery process to discuss what each participant would be able to share, and the benefits to each participant achievable from the data exchange. This helped participants understand each other and revealed to them that not all data

attributes are required from the other side to reach their benefits. The process also increased the responsibility of data owners and enabled both parties to use the obtained data with full confidence in its reliability and validity.

A judgement about project success or failure is dependent on the conditions of project type, its context, criteria of assessment, and time (Zwikael and Huemann, 2023). We agree that project outcomes can be evaluated by resulting benefits, commercial success, stakeholder satisfaction, sustainability, and efficient use of resources (Pinto *et al.*, 2022).

Therefore, in presenting the project results we keep to facts and figures only.

4.5. Economic and operational effects

The pilot project was run from October 2020 to December 2022. In March 2021, integrated data was released in utility bills, which reflected the number of registered citizens at a specific address. As a result of integration, databases of utility service providers increased significantly: 17% or more depending on a supplier. For example, the consumer base of a cold-water supplier increased by almost 258 thousand people (23%); another supplier claimed year-to-year income rise by 11%, and their consumer base increased by 243 thousand people (34.5%). Overall, bill payments for communal utilities increased by five million US dollars per year.

Regarding operational effects, utility suppliers obtained access to regular updates on actual numbers of people's registrations at a particular address. That means in the future, the suppliers will not depend on paper verifications from a property holder but will get the information about registration changes on the address from the trustful governmental source directly.

4.6. Legislation impact

The deployment revealed the inadequacies between normative rules of utility providers and changes in national legislation. As an illustration, reference papers about a citizen's registration were abolished in 2019, however, normative rules of some utility providers defined the reference paper as the only source of proof for the citizen's registration.

Another obstacle was discovered as a conflict of interest between utility providers: for some providers, it was more profitable to count fewer people, while others wanted to bill both registered residents and those without official registration. Such disjuncture can be regulated by changes in city rules which should be obligatory for all utility providers, despite their industrial affiliation. Apart, the city authorities will legally ascertain the providers with the right to use digital confirmation from the city data exchange platform.

We assume that similar legislative discrepancies will be discovered with the implementation of other cross-sectoral municipal projects. One of the possible solutions might be to introduce in the city an experimental legal regime, also known as a regulatory sandbox. The

regulatory sandbox allows unobstructed testing of new technological approaches and related business processes that do not conform with current legislation. Being the biggest economic centre of the country, Almaty city thus can examine legal obstacles on the way to transforming into an open-system digital economy.

4.7. Impact on citizens as final beneficiaries

In the mid-term perspective, filling the multi-year gap of lost revenue by utility providers should be transformed into the modernization of communal infrastructure and tariff containment for utility services. Analysis of consumption and payment patterns allows us to foresee potential areas to improve urban planning such as energy saving, water leakage prevention, and others.

In the long term, the deployment discovered the opportunity to develop proactive social services for residents. Together with stakeholders, we examined all 47 social groups and benefits that are applicable in Almaty city in the areas of healthcare, education, public transport, and social protection. As a result, some categories were merged and the final list comprised of 27 ranks. Technical capabilities of the platform can enable the municipality to proactively provide discounts to certain social groups - for example, by age or disability. In contrast to current practices when residents have to paper-prove their social status in different instances, the city exchange platform can automatically deliver the changes in the resident's social status to all agencies concerned. The implementation of social discounts through data integration will serve as a real deployment of the 'Digital First' principle. We assume that in the future such an approach will encourage citizens to share their data with city authorities more freely, as it will bring visible benefits to them.

To support this claim, we refer to a Nesta poll, which found that "73 per cent of people said they would share their personal data in an effort to improve public services if there was a simple and secure way of doing it" (Nesta, 2018). Moreover, perceived benefits of data sharing are more clearly and positively associated with willingness to share (Habich-Sobiegalia and Kostka, 2023).

5. Findings

This section reflects the results of exit interviews with key project stakeholders, according to elements of the Commitment-Trust theory.

5.1. Drivers, Expectations, Shared Values and Benefits

As for participation drivers, the project sponsor indicated several reasons: first of all, he wanted to create kind of a structured library, where "all the data should be processed in one environment and speak to each other in one language" (project sponsor, top manager, A1), because numerous city information systems were established in different times and various languages, each system with its purpose. However, "the idea was not to create the data warehouse for the data

warehouse itself but to enable the city data to become the unique source of truth” (project sponsor, top manager, A1).

The second reason to start the pilot project was the necessity to prove the chosen data management approach with limited financial resources. The approach was extremely novel, “there were no solutions in Kazakhstan, not in Central Asia, even Moscow was not able to meet our expectations” (project sponsor, top manager, A1).

The third driver was to get a full and correct picture of city residents “because our city is huge and deserves proper data management” (project sponsor, executor, A3).

The project sponsor’s expectations were formed during the pandemic, when local businesses were helping the municipality to address COVID challenges, including data sharing. “We realised that the goodwill to share for residents’ benefits has a great potential in the city” (project sponsor, operational manager, A2). However, there were certain concerns that the project would not be supported by the central government, because of its very new idea. Sharing data within the governmental ecosystem is an uphill task, sharing across ecosystems is even further, and the magnitude grows in geometrical progression.

The technology provider was excited to participate, because “this project lends to the concept that people’s data is the centre for smart cities” (technology provider, top manager, B1).

The utility data custodian broke expectations in different slots: 1) organisational – to agree on data attributes and formats between all utility providers, and 2) technical - data obtaining and further usage in their own information systems. According to him, technical implementation progressed as planned, but reaching agreements between utility providers took longer than expected.

We have to admit that all parties anticipated a strong project sponsor’s engagement, to make the project happen. During project implementation, we noticed that all organisations were relying on power endorsement of certain decisions, not on negotiations. “I thought initially it's not going to be easy, to get agencies to share their data” (technology provider, executor, B3).

Because the project purpose ‘*to increase utility billing by providing actual figures on resident registrations*’ was distinct and KPIs were agreed prior by all participants, the parties had common ground about the results the project wanted to achieve. However, the question “Did you believe in voluntary data sharing”, discovered different values each party had in the beginning. While the project sponsor was dreaming of introducing the ‘Digital First’ principle and changing current business processes towards cross-sectoral data management, custodians were thinking in opposite directions.

“Participants are different. Utilities want to make more money only” (government data custodian, top manager, C1).

“At the beginning, I thought interaction would be like ‘take our data for granted’. However, during project development, I started to be curious about what errors in our data can be identified from another data source.” (government data custodian, operational manager, C2).

“I did not believe in data sharing at the beginning, because we did not see such precedents of integrating data from different sources in the public sector” (utility data custodian, top manager, D1).

“At the beginning, every party was more concerned about their organisation interests, and at the end of the project, we came to a common ground of residents’ interests. When this value was realised by all utilities, then it became possible to finalise new internal regulations on rendering utility services” (utility data custodian, operational manager, D2).

It should be noted that previous interaction between the government data custodian and communal utilities was via official requests only, pointing to a specific household problem. During the project, they established other channels of communication, even on issues beyond the scope of the project.

As for project benefits, the project sponsor wanted to increase paybacks on municipality-business relationships that were bound by the pandemic. The pilot project helped utilities to start filling the long-term gap of lost revenue, about five million US dollars per year. In the sponsor’s opinion, it was very important and timely, because there was no tariff increase, only a data management virtual tool was used. Another mentioned benefit was that the project and the municipality received strong publicity nationwide and internationally. Almaty Data Lake became one of 14 finalists of the IEEE Smart Cities Awards Contest 2022, run by the Institute of Electrical and Electronics Engineers, the world's largest professional association (Institute of Electrical and Electronics Engineers, 2022).

The technology provider predicted that benefits will increase when organisations share data across multiple ecosystems - like from healthcare to education, from social protection to public transport, and to utilities.

For the utility data custodian, the project was about increasing the company’s reputation as a reliable IT-solution provider. For the government data custodian, the project served as a hope for new contracts to come.

On a personal note, participants mentioned a desire to improve the lives of residents, new experience in role distribution and data manipulation, and understanding the value of their data as a part of residential data. Technical people also saw an opportunity to obtain new responsibilities and personal promotion. Worth mentioning participants’ claims, that by the end of the pilot project, they realised what impact data sharing may have on residents as final beneficiaries.

5.2. Obstacles encountered, conflict of interests and termination costs

Through meeting observations, we saw that at the beginning of the project, there was a resistance of people to share data, because the new approach was breaking usual dogmas and rules.

“I believe that the project could have moved faster if participants were ready to consider data from a legal point of view, what they can share and what they can't. Rather, from the starting point, people come from the perspective that they can't share anything - I think that should not be the attitude of data owners” (technology provider, top manager, B1).

The project owner worked around this obstacle through official clarifications, to confirm adherence of depersonalised data sharing to current legislation. However, the project sponsor himself encountered various hurdles at the central government level, because the new data sharing approach discovered weaknesses of siloed central databases as a lack of mapping keys between different data sources, and others.

For utility providers, the most difficult was to agree on attributes to share. This was addressed via open negotiations with each party concerned, and limiting data-to-share to a minimum. Finally, utility providers developed their internal regulations to fix new business procedures, though the process of agreeing and approving new regulations had taken much longer than expected.

During the implementation, it was a period of high volume of requests for data clarification. But custodians were already committed to clear data because they saw how they could improve their data quality.

The project sponsor did not expect that they would be so heavily engaged in business processes' changes beyond the 'digital framework'. “We cut the long-standing Gordian knot, although this turned out to be an unexpected amount of additional work for us outside of our functional responsibilities” (project sponsor, operational manager, A2).

Regarding termination costs, exit interviews revealed that commercial entities are more dependent on governmental data than vice versa. Specifically, for utility providers, relationship termination would mean loss of up-to-date data source and they would need to look for another similar solution which may not be free and would be consequently reflected in billing costs, or keep paper evidence which is not sufficient.

For the municipality, the project closure will not destroy current governmental major functions, but it will seriously hit the establishment of new forms of cooperation between state and society and therefore the whole concept of 'digital transformation'.

“Next generations will say these stupid old guys destroyed our future because they didn't predict the problems which we are going to face, even though they had this opportunity. Imagine you have a very good book on your table, but you don't read it. After a problem happens, you check the book and find a solution there. And it is just your fault that you didn't predict the problem, though the book was on your table” (project sponsor, top manager, A1).

Some participants noted that citizens trust the government more in using and safeguarding their data, and it would be difficult to explain why the municipality does not participate in the data sharing project. Again, commercial companies expect the municipality to manage such projects, and to have state intervention in case of disputes.

That links to the question of potential conflicts that may arise between participating organisations in the future.

Some participants expressed concerns that growing databases will allow a full 360° view of an individual, and there be a conflict from a privacy point of view. To avoid the ‘mosaic effect’ (Deloitte, 2012), the project owner took the responsibility to monitor access to the data, though technically the exchange platform can enable everybody to get all data stored.

Conflict of commercial interests is possible and may lead to the tendency to share less meaningful data in exchange for valuable ones. To maintain the balance of interests, the project sponsor keeps the right to invite a new alternative participant. “We understand a potential conflict positively – if a project participant decides to quit the project, then we will include another similar participant into the loop” (project sponsor, operational manager, A2). As we see, sometimes it would be impossible to avoid state intervention.

Based on interviews, we recommended the project sponsor introduce in the future formal agreements with participants, where specific use cases and required data will be identified, to avoid potential conflict of interests and law violation.

5.3. Increasing trust and commitment via data exchange

We knew that the data had been serving a particular organisation quite well and that means the data itself should be relatively reliable and trustable. But we also expected that there will be errors and inconsistency in data because the source systems are conceived in silos. Only with a comparison of two data sources, the discrepancy will come up. However, the question of data clearing at the source remains on the data owner’s side. That means the custodians had to commit to clearing their data back at the source, to keep a certain level of trust in the common space of the data exchange platform.

“Data is as trustworthy as clean at the source. Within the data exchange platform itself, it does have some capability of validation and safeguarding, to make sure that the data that comes in, conforms to certain predefined standards. However, it still goes back to the source. It’s like garbage in garbage out” (technology provider, operational manager, B2).

Development and usage of common reference dictionaries (metadata) was mentioned by several participants as another way to maintain trust in data and commitment to the project.

Understanding that the issue of data purity will increase with the advent of additional data sources, the project owner later introduced an additional rule of testing new data first in cross-sectoral analytical cases and then allowing it to be uploaded to the exchange platform.

There were concerns at the beginning of the project that the data might be stolen or used for other purposes than originally stated. A vital change happened when the participants saw that depersonalised data was collected on the principle of ‘less data is better’ and when they were convinced of the reliability of the chosen technological solution.

When interviewees reflected on commitment, most of them moved to general concepts of people's behaviour. One described data exchange as a modern way of communication between people when information sharing becomes the basis of own improvement. Another spoke about the spirit of community, which should understand the value of sharing first, then people will share their data more willingly and the whole value of sharing can be realised. There were passages about commitment as the way to pay back to society and about passion for making something significant for residents and personal satisfaction. The red thread was about learning more about each other and creating a venue for conversation and collaboration, for more things to be done together.

The above mentioned reflections allow us to assume that our project contributed to the formation of smart citizens, who are ready to participate in the development of smart cities (Younus *et al.*, 2023). Smart citizens feel empowered and entitled to actively participate in designing and improving online public services for their direct benefit and also for their city advantage (Ianculescu *et al.*, 2019). This transformational process due to participation in voluntary data exchange might be an area of interest for further research.

6. Conclusion

In this paper, we have explored the motives for governmental agencies and commercial companies to engage voluntarily in data exchange and how can this new approach impact areas of city development.

In our exploration of the research questions, we applied the Commitment-Trust theory in the Government-to-Business environment and proved the possibility of voluntary data sharing between different ecosystems. The research demonstrated that the fulfilment of the common goal of fostering socio-economic development requires adequate settings of relationships between participating organisations. With the alignment of the settings, it is possible to build new ways of communication, form shared values leading to trust, commitment, and cooperation. Due to limitations of the pilot project, we did not explore how commitment and trust influence other parameters, we hope to research the possible impacts in our future work.

Changes related to the new data management approach have the effect of circles on the water – in our case, simple provision of utility providers with the number of citizens registered at a specific address had significant consequences: additional revenue, changes in interaction with consumers of services, changes in internal regulations of suppliers.

The main change in the existing business processes between government agencies and commercial companies was the introduction of the 'trust in each other' principle. At the data exchange platform, the parties voluntarily agreed to exchange data and committed to be

responsible for the purity of their data. In our view, this is a bold example of cooperation, that leads to joint development of proactive services for residents.

The idea is novel in terms of the potential benefit that can come from the data sharing project, much more than organisations can do separately on their own. Benefits increase when organisations share data within ecosystems, and furthermore with sharing data across multiple ecosystems - all those areas that impact the lives of residents.

Our research identifies that most of the root causes for resistance to data sharing are based on the fear of breaking the law. To make the new data sharing approach sustainable and legally approved, a *regulatory sandbox* may help as a good solution, to showcase all the benefits and potential of such an approach. In this regard, strong leadership from the public sector is required to enable a legislative framework.

In terms of project scaling, the study may encourage potential data project implementers to deploy their innovative smart city initiatives and enhance efficiency in digital transformation and integration. Our socio-economic experiment demonstrated one of the ways to address siloed data structures and legal and behavioural barriers.

A decade ago, Noveck claimed, "...there is next to no research on the practices institutions use to collaborate with citizens to solve problems that touch people's lives, and almost no empirical testing of alternatives in real-world contexts" (Noveck, 2015). Surprisingly, our ongoing literature reviews within this area lead us to reiterate this proposition. We invite the research community to help bridge the gap between theory and practice within this field.

Declaration of Competing Interest

The first author was employed by Almaty city Department of Digitalization in 2020-2022. No competing interests are declared for the co-author.

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