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Chapter

Data Monetization Model for Sustaining Smart City Initiatives

Mercy Samuel and Siddharth Gupta

Abstract

This chapter aims to create a G2B business model framework for data monetization under Smart City Mission (SCM) in India. It sets a premise to understand the urgency of a data monetizing model as a revenue option for sustaining the smart city initiatives. The sustainability of smart city makes it inevitable to look for a separate revenue stream for cities to fund the operations & maintenance of smart city infrastructure created under SCM. The chapter explores few attempts made by other ministries in India towards data monetization and the role of data privacy and sharing policy for protection from data exploitation. The first approach to the research includes analysis of cases of other smart cities and data monetization initiatives around the world. Further the paper also explores the kind of data generated under Smart City Mission India to understand the possibility of monetization and its value for different stakeholders. The limitation of this study is that data monetization has not yet been rigorously tested in practice in the government sector. Hence the current study attempts to explore the potential of the same as a financing option for sustaining smart city initiatives in India.

Keywords: data monetization, data exchange, smart cities, internet of things, self-financing cities, business model, data marketplace, government-to-business, urban data exchange, business model canvas

1. Introduction

Smart Cities Mission is the Government of India’s urban regeneration and retrofitting project launched in 2015 to create livable and sustainable smart cities in India [1]. The Indian government through a competitive process selected 100 cities to be developed as smart cities in multiple rounds. The cities were required to submit their proposals in two categories viz. pan city and area-specific proposals. Different cities chose different services to plan and prepare their proposals with the help of consultants and participated in the competitive process. Finally, 100 cities were selected to develop themselves based on the proposal submitted. The government of India dedicated a whopping US$ 6.3 billion for smart city development. Most of the smart city projects revolved around applying smart solutions to the infrastructure, mixed land use in area-based growth, improving housing opportunities for everyone, defining walkable areas, maintaining and enhancing open spaces, supporting a range of transit choices, etc. There was extensive tech deployment in the smart city project and
technology was identified as an enabler for city management. Tech deployment generated data that could be converted to information for better planning and strategizing.

A total of 5151 ventures worth some 2,05,018 crore is to be completed in 5 years from the respective selection date of the cities under the scheme under the Smart Cities Programme, which was initiated in 2015 [2].

As of March 2019, under the Smart Cities Mission, integrated command and control centers (ICCCs) estimated at Rs 27.7 billion were made operational in 15 towns [3]. The ICCC identified as one of the projects in many cities were designed as the “nerve center” for operations management, day-to-day exception handling and disaster management. In addition, Rs 22.6 billion schemes are under development in 31 towns. The government has also initiated tenders in over 18 cities for projects worth Rs 25.5 billion [4].

The idea for a Smart City must provide funding strategy for the Project’s full development cycle. The financial strategy should define internal (taxes, leases, permits, and usage fees) and external (grants, delegated sales, loans, and borrowings) streams of capital expenditure allocation and activity and maintenance over the project’s life cycle. This financial strategy would include outlets for recovery of project expenses for a span of 8–10 years or more. O&M expenses which would also provide ULB’s financial planning, capital management action plan [5].

When communities are planning to update their facilities with new technology, the large-scale deployment of advanced technologies raises a huge obstacle to compensate for such ventures. Cities are limited by small budgets and need to define market models that can help draw private investment to render and sustain the transition financially.

It is imperative for Smart Cities to identify a revenue generation model to specifically take care of all the tech devices engaged in data capture among other expenses. Smart cities will have to continually search for ways to exploit the development infrastructure and network to create new revenue sources for smart cities. Throughout growing layer of the company model, suppliers and collaborators will consider innovative ways to produce income from the products and services they offer. Such opportunities could mimic the business models used in the digital economy as a whole.

It is particularly essential for India, as cities are trying to automate their delivery of public infrastructure by introducing interconnected Pan City Smart Technologies under the Smart Cities Project by producing huge volumes of data. Meeting digital infrastructure’s operating and maintenance costs, measured at 15–20 percent of capital annually, would be a challenge unless the cities think of innovative mechanisms to generate revenue monetize city information [6].

The Economic Survey (2018–2019) proposed that the government intends to monetize the data of residents as part of a wider strategy to use data as a public good. There is no justification to prohibit the private usage of this data for benefit, in keeping with the notion of data as a public good. Although the social gains will well outweigh the government’s expense, at least some of the data produced would be monetized to alleviate the burden on government finances. Datasets may be provided to analytics firms that analyze the results, produce insights and offer insights back to the private sector, who in effect will use these insights to forecast demand, find untapped opportunities or develop new goods [7].

Today data is called the “new oil” as it could prove to be a valuable resource. These days companies are using data analytics to grow and optimize business, by understanding customer patterns, which in long run adds value and helps to foresee the modification necessary to be made that can easily outrun their competitors, therefore data becomes the game changer in competition. This has led to the monetization of data by companies from B2B (business-to-business) that could be used to optimize
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self-processes, design strategy, and could be sold externally. Comparing to this monetization in private sector, data from G2B (government to business) is still in nascent scale across globe. This gives an opportunity to tap underlying potential of tremendous amount of data bank with the government which could be monetized and can generate revenue streams by G2B (Government to Business) model.

Selling the data or analysis derived from it, have been studied scarcely in business and academic literature. In academic literature, the phenomenon of big data and the utilization of it have been popular topics over the last few years. The interest in the subject of data monetization has also increased due to the rise of digitization and big data. The principle of monetization, providing new value and data earnings, is not new and yet the practice has not been thoroughly studied.

Changing the market landscape, on the other side, provides different data use opportunities, data monetization being one possibility for broader data use. This has created a research void, as businesses are increasingly using the data in new ways, while the academic literature does not cover offers extracted from such new data. The result of this research provides a probable business model framework of this new emerging data marketplace. Due to limited availability of data and to get a head start, the business model canvas by Alexander Osterwalder, a business theorist with works on business model is used.

2. Background

Data no longer acts as a secondary asset in the current world used for decision making or processing but is now taken the front stage where it in itself to could be productized to sell and use. This new role is referred to as “Data Monetization”. But at the same time, various factors and risks are involved when a new product is ever launched in the market. First is overcoming the reluctance over its transparency when related to data sharing on different platforms and second is a platform where it could be safely stored to be shred, processed, or moderated with no harm to data as well data source owner [8]. At the same time, it is important to understand that data is not only about incorporating information technology or providing business intelligence.

Data in itself has formed an economy in which the extraction of data from IoT devices has given thrust. With the advancement in IoT, data is also exponentially growing. With the growth in data, its monetization would become more real. But there has to be certain standardization when it comes to monetization. For example, devices such as Wi-Fi, GPS, beacon, would produce data related to location or region and say sold to a cab service [9].

For example, the healthcare industry is a sector that has immense potential to generate revenue streams by monetizing their health care data. As a seller, pharmaceutical organizations could be seen as a strong customer base to buy the data from medical labs where the disease insights will be gained. Data on chronic diseases could be shared with healthcare partners or retail players producing health equipment or health food product. As a buyer, health insurers could provide data on the claims to the healthcare providers to improve their services and minimize their financial risk. Thus, data needs to be exploited at its fullest not only for revenue but to improve service delivery [10]. In developing countries, the responsibility to collect Health data regarding population, prevalent diseases, lies with common health workers (CHW). But the lack of incentives for these CHWs leads to challenges in the collection and aggregation of data. The most common hurdle is the technological challenges, i.e., difficulty in usage of computer or internet facility. Secondly, maintaining a similar pattern while collecting data, especially over larger nations where the accumulation of
data in itself would be a challenge. Thus, overcoming these hurdles would be the first step towards making data monetization in healthcare possible [11].

It is not as simple a job to extract data and supply, but involves a team of participants who would create an entire data ecosystem through understanding both dynamics as well as structure. These participants include data manager, suppliers, custodian, aggregator, developer of the application, and a service provider. Setting the pricing, IP protection, and privacy concerns are the most highlighted concerns in data monetization [12].

A revenue model is what comes next after the formulation of the business model where data-driven service is sold by the start-ups to the consumer through four distinct business models. Subscription model, Usage fee, and gain sharing are the most common type that is generally taken up by individuals, small enterprise, and private office through limited access. The multi-sided model incorporates any previous three models with beneficial addition of extra data or helps to create revenue from one model to another [13].

Data not only serve as a revenue stream but the open data concept has created a lot of transparency in the system of people and government. Government data available on the public domain helps to define services that are offered. The datasets released by the government highlights the progress of the projects, census data, etc. which are all the core of any ecosystem or industry [14]. A suitable example is the monetization of the vehicle data ways by the government of India from the Ministry of Road Transport and Highways (MoRTH). The ministry has sold vehicle data and registration records to the various private and government entities worth more than 50 crores till date in duration 2014–2019. The buyers comprise of 30 public and private sector banks, 20 logistics solution providers finance organizations 18 insurance organizations, and 5 automobile manufacturers. Only the non-personal data of the vehicles for share and a total of more than 20 indicators of 50 crore registrations have been sold. Source.

The third case from the Indian urban data exchange with established under Smart City mission. The first urban data exchange of an Indian city is established by Pune Smart City also known as Pune Urban Data Exchange (PUDX) which has 850 data sets available on the detection website.

This is the initiative from the Ministry of Housing and Urban Affairs (MoHUA) and Indian Urban Data Exchange (IUDX), and Pune Smart City. This is to help citizens, academic institutions, entrepreneurs, government, industry, and cities. In their first stage, they have connected the Smart City administration, police, cab operators, cellular service provider, safety data aggregator, safety application provider, citizen mobile apps. In their recent initiative, they have launched the women safety application and this platform has integrated the data from the street lights, police, traffic, geographical location to serve better to the citizens in need.

Also, there are few bigger players in the industry in such as Amazon Web services (AWS), Dawex, Quandl, and Centre for Monitoring Indian Economy (CMIE). These companies are big players in the data exchange business for quite a long time and each has its own a diverse database but each operates on a distinct model.

Among these few companies have been compared and used as a benchmark to formulate the business model further in research.

2.1 Smart City data

Smart cities are constructed by connecting the city’s public infrastructure with city application systems and passing collected data through numerous layers. City application systems then use data to make better decisions when controlling different city infrastructures [15, 16]. These application systems allow additional ICC
components to aggregate, consume, and process the information for deriving insights. Data collection and processing consists of modules for collecting and converting data from multiple structures, data repositories and diverse data formats [4].

The ICCC is the city’s brain, making it smart, sustainable and ready for the future by monitoring all of the city’s activities. Such centers are built to integrate knowledge through various applications and sensors deployed across the city, and then provide actionable intelligence with accurate analysis for decision-makers with the aid of sensors installed throughout the region [3]. The data collection under ICCC collects real-time data from sensor systems, data sources, static and real-time data streams for air and water quality control, light sensors for street light monitoring, metering tools, telematics and location-based apps, proximity sensors, surveillance and security cameras, sensors for disaster detection [2]. Hence, the data is distinct and non-perishable in nature making it a unique value proposition.

Smart cities had already started using data for good governance and taking strategic decisions. For example, the city of Ahmedabad in the state of Gujarat deployed Automated Fare Collection Service (AFCS), Automatic Vehicle Location System (AVLS), Passenger Information System (PIS), Vehicle Planning Schedule and Dispatch System (VPSD), Depot Management System (DMS) in their Bus Rapid Transit System. These are few of the IoT systems deployed in traffic system in smart cities which will later form a basis of study for targeted customers. All of these involved immense tech interventions and hence could generate real-time data for city transit service. Around 69 cities of the 100 cities have created Integrated Command Control Centers [17]. Data from each service is collected and analyzed uniformly in a command control center against key performance indicators to create more efficient and dynamic bus service operations, and a smarter, safer travel experience for commuters, across the ticketing, in-station, and in-journey stages [18].

The Bhubaneswar Smart City of the state of Orissa had deployed environmental sensors for, a sensor-based monitoring dashboard. The main environmental challenges that Bhubaneswar faces include rapid unplanned development especially construction, increasing pollution from vehicles and commercial establishments, road dust and other fugitive emissions, and significantly higher noise levels. The instruments transmit sensor data to the cloud platform through Ethernet / General Packet Radio Service connection, where it is stored and real-time analysis is done to make it meaningful. It is then visualized using a pollution-monitoring dashboard, where data is presented using interactive graphics and statistics for easy interpretation by citizens and administrators [19].

This data gives insights to the cities to take strategic decisions on several dimensions for better service performance. This creates an enabling ecosystem to make the cities liveable. They are also used for monitoring citizen activities in public spaces making them also participate and be responsible for their conduct which is a crucial factor given the population and diversity in India.

Internet of Things (IoT) is revolutionizing the functioning of smart cities, especially in areas such as Efficient Water System, Smart Traffic Control, Accessible Public Transit, Energy-Saving Houses, Smart Parking, Productive Parking, Smart Street Lighting, Safe Environment, and Waste Management [20].

Indian government has succeeded in creating an Open Government Data (OGD) portal to promote transparent data. On this portal data is already being pooled to a data lake and refined for public use from a data warehouse. This website helps policy agencies to distribute their data sets for free public access, in a transparent format. Around 538,330 resources have been submitted to the website so far, and has received more than 31.64 million views. Many of those types of data can be personalized and optimized [21].
Thus far, from 100 Smart Cities the accessible data network has 12,547 data catalogs. Despite of having huge number of data catalogs the level and refinement of these data is not enough to get rich inferences for the cities. The data is being collated at macro level but still the analytics are weak and lead to suboptimal utilization of such real time data to take strategic decisions for the city. Wherein it can be observed that the private data platforms are able to sell their product due to the depth, richness and extent of information the data is able to generate for specific user segments. Many private entities like Google, Facebook and various e-commerce companies are able to utilize the information obtained from their platform to sustain and grow their businesses or even arrive at data-based business models.

In contrast to that, being one of the complex and high maintenance systems involved in smart city missions, the data portal initiative needs to be taken to a level where it is capable enough to cater needs of data consumers and could support a part of expenses by revenues generated from it.

2.2 Smart City finance

The Smart City Mission being a Centrally Sponsored Scheme (CSS) the Central Government of India provides budgetary assistance to the Smart City Project to the amount of Rs. 48,000 crores over 5 years, i.e., an average Rs. 100 crore per region annually. The State / Urban Local Bodies (ULB) would have to spend an equivalent sum on a reciprocal basis; thus, almost Rupees one lakh crore of government / ULB funds would be required for the creation, operation and sustenance of Smart Cities.

The investment plan of each Smart City is different, based on the degree of commitment, model, implementing and repaying ability. Substantial funds are likely to be needed to execute the Smart City plan and to this end both the Center and the State must use policy grants to raise financing from internal and external sources.

The Government of India (GOI) grants and the States / ULB funding allocation would only cover a fraction of the expense of the initiative. Balance funds for operations are required to be collected through novel funding frameworks. Some of the smart cities are able to tap potential of municipal bonds, land monetization and other methods. The GOI encourages smart cities to come up with innovative financing methods to make Smart City systems more sustainable. With immense capital deployment under smart city mission the cities in India are in a dilemma to sustain the initiative as the operations and maintenance of smart city assets need to be fetched by the urban local body itself [7].

Although smart cities have been provided with some seed funding from the Centre and the state, with some to be created by their own budget, the financial necessity remains enormous as smart city strategy needs to support the whole city and not just the region specified for growth in the times to come.

2.3 Data as a source of revenue for cities

For example, “Terbine” is an enormous system of IoT data feeds to organizations involved with smart city research and pilot projects. This exchange offers sensor data sources that include electricity, water, wastewater, air quality, vehicular counts and movements from land/air/sea. Data researchers use deep web searching and customized Terbine tools to seek out publicly available machine-generated/sensor data from many sources. These include towns, cities, counties, and states, whole governments around the world, plus universities, research institutions, and more. Searchers then create highly descriptive metadata and submit them for entry into the Terbine system.
Thus, bringing the data generated from the actual infrastructural elements found within and around municipalities into a single cohesive system, makes it discoverable and usable to researchers and project implementers alike [22].

With virtually every industry sector beginning to utilize Artificial Intelligence for internal processes, systems operation, supply chain and logistics, plus customer interactions, the requirement for AIs to discover, access and process data coming from machines is increasing rapidly. Smart cities in particular are key areas for implementation of AI-based functionality [23].

The technology revolution which is envisaged here would cost capital. Given that the private sector has the ability to harvest huge dividends from this information, charging them for its usage is common but there are limited cases where cities are monetizing data as a revenue model [7]. The financial position of cities in India is not encouraging enough to fund for the operations and maintenance of smart city projects. It is imperative for them to find a viable source for continuing with the initiatives taken under smart city mission reasonable.

The Ministry of Road Transport and Highways (MoRTH) experimented with monetizing vehicle data. The ministry came with a bulk data sharing policy to share data related to driving license and vehicle registration to various private and government entities. The buyers comprise of public and private sector banks, logistics solution providers finance organizations, insurance organizations, and automobile manufacturers. Only the non-personal data of the vehicles was shared and a total of more than 20 indicators of 50 crore registrations have been sold [24]. Though policy have been scrapped now, the agency monetized data to a considerable extent. However, in 2020 the policy was scrapped due to privacy issues arising out of triangulation [25]. This initiative if applied appropriately with better business models and backed by data privacy settings in accordance with the data privacy act (still in draft stages in India) can not only help government agencies generate revenue but also would be provide a sound base for researchers, private businesses, lending agencies to better strategies their offerings.

2.4 Data from G2B as a source of strategic competitive advantage

Information is a critical source to attain competitive advantage. Both established competitors and new entrants in most industries leverage with data-driven strategies to innovate, compete and capture value.

Vast data sets are being compiled and evaluated to identify trends for decision making and developing intelligent strategies to enhance the value proposition of the offerings. According to research carried out by the McKinsey Global Institute and the Market Technology Office of McKinsey & Company, the sheer volume of data produced, processed and extracted for insights has become economically important to companies, governments, and consumers [26].

Companies in current times could effectively monetize from data through enhancing their data storage and offer the data to other customers or companies. Data could be raw or purified based on the inventory and needs of the buyer. Vodafone sells mobile network data to TomTom to enhance their real-time navigating services. Similarly, Barclay’s bank provides a platform for SME companies to compare their financial (key performance indicators) KPIs to others. But at the same time, the major setback would be the ability of the partner or purchaser to have the same system that would support data apart from the sensitivity of it [27].

Since the data in G2B is unique in nature, it can help generate potential development possibilities and completely different market areas, such as those aggregating and
reviewing data from the sector. Many of these will be companies that are sitting in the middle of large flows of information where data can be captured and analyzed about products and services, buyers and suppliers, consumer preferences and intent [26].

As soon as businesses and policymakers realize Big Data's ability to produce higher efficiency, greater value for customers, and the next phase of innovation in the world economy, they will be granted a good enough motivation to move robustly to address the obstacles to its usage [26]. Like the targeted advertising which Facebook and other tech giants practice is a big business for them.

This is the kind of potential government can unlock out of their collected data. In doing so, they will open opportunities for new market competition, higher public-sector productivity that will make for improved infrastructure, and balance fiscal deficit to some extent.

2.5 Policy and regulatory framework

As of now regulatory framework Personal Data Protection Bill (“PDP Bill”) and Information Technology Act, 2000 (“IT Act”) empowers the government to manage and organize the data within government and non-personal data to various stakeholders. But the PDP Bill introduced various contentious concepts such as data localization and data mirroring, which caused much consternation among corporate stakeholders who would have had to restructure significant parts of their data flow architectures to comply with such requirements. The existing IT Act is a relic of its time and does not adequately cater to modern data protection requirements. Therefore, a comprehensive overhaul of all data laws in India is a positive step towards solving India's data woes in a holistic manner. Recently media reports citing that government sources have indicated that the Government of India will shortly commence work on a new law to replace India's IT Act. As part of this process, it appears that the Government may introduce policies on data governance and cybersecurity, a “Digital India Act” to replace the IT Act and new regulations to replace the PDP Bill [28].

In support to this the Ministry of Electronics and Information Technology, GOI released draft National Data Governance Framework Policy (NDRFP) empowering data to be harnessed for more effective Digital Government, Public good, and innovation by maximizing data led governance and catalyzing data-based innovation that can transform government services and their delivery to citizens, especially in areas of social importance that include agriculture, healthcare, law and justice, education, among others. This policy also launches a non-personal data-based India Datasets program and addresses the methods and rules to ensure that non-personal data and anonymized data from both Government and Private entities are safely accessible by Research and Innovation eco-system [2]. But considering the risks like triangulation and revealing the identity of individuals and assets it has to be handled carefully so that data sets from open sources and received under NDRFP combined should not lead to privacy issues like what happened with vehicular data from Bulk Data Sharing Policy under MoRTH.

3. Methods

Selling the data or analysis derived from it, have been studied scarcely in business and academic literature. In academic literature, the phenomenon of big data and the utilization of it have been popular topics over the last few years.
The changing business environment creates new possibilities for data utilization, data monetization as being one option for broader data usage. This has created a research gap, as companies are increasingly using the data in new ways, while the academic literature does not cover these new data derived offerings. Therefore, the concept of data exchange is a nascent Indian ecosystem and is more practiced on B2B with high confidentiality on backend thus this is an under-researched theoretical topic in the Indian context, therefore, the qualitative methodology with support of case studies, documents and journals from various sources for data is used. Further, due to limited availability of data wherever suitable, the case studies, and practical practices would be used for the genesis of this exploratory research.

4. New perspective

4.1 Leveraging Smart City data

Smart Cities are deploying emerging technologies to capture real time data from cities in different sectors. Barcelona, Copenhagen and Singapore, as indicators of Smart Cities, are frequently cited being the front runners. There are examples of Big Data and its insights for enhancing the transport industry tremendously in a number of ways. It may be used to ensure that at any given moment, consumers are constantly made informed of the most appropriate / efficient mode of transport. Train operating companies now use Big Data to process live seat allocation data to say which carriages have the most seats available to passengers waiting on station platforms. Public transit is one of the main problems confronting today’s communities. For example, in the transport sector big Data includes such data on bus and rail vehicle occupancy, real-time car parking data, local weather and air quality data, road speed and traffic count data, and real-time infrastructure status. Customer identification may serve to optimize customer satisfaction in addition to the improved customer experience resulting from improved awareness. The collection and successful review of the same customer’s repeat grievances may result in a single, more efficient response. Smart Cities and Big Data will also enhance customer satisfaction by providing creative technologies that substitute both system and ticket utilizing mobile apps [5].

The more integrated and open our rail networks are, the greater the profits for travel companies and transporters. Improved information for consumers would contribute to a more effective usage of transport networks- time and resources optimization for passengers. Previously, the amount of time saved arising from the opening of Transport for London's accessible data was calculated to be around £58 m a year, with an average investment of less than £1 million. Additionally, the Big Data buying / licensing industry itself, and other associated businesses, would broaden and thereby boost economic development as a whole [5].

Smart City data also helps digital marketers to help target consumers with more tailored advertising they will more definitely like to see. Google, and now Facebook — the main digital ads players — have proven really good at developing and providing more non-intrusive advertisements. The explosion of mobile apps, especially smartphones, has provided a significant incentive for digital marketers to offer mobile unique advertising at the right time — in context — to the right people. It has been seen that hyper-localized ads improves consumer interaction and sales volume. This will also put forth actionable perspectives that guide strategic decisions and strategies [29].
4.2 Business model canvas

These data exchange work on specialized service delivery business models. For creating a simplistic picture, Business Model Canvas by Alexander Osterwalder is used. A Business Model Canvas is a strategic management tool to quickly and easily define and communicate a business idea or concept. It is a method that works through the fundamental elements of a business or product, coherently structuring an idea. In these, the customer segments which the entity is going to target base on the segment, value propositions based on the amount of value and USP we can provide to the customer, channels for delivering the service, type of customer relationships to be maintained with the customer, revenue streams that would generate income for the business, key resources required to run the whole business, key activities that need to happen to sustain business and operations, key partnerships that are required for business, the cost structure of all the expenses of the smooth functioning of the business [30]. These are identified to formulate in-depth insights and design a business layout as shown below in the Table 1.

<table>
<thead>
<tr>
<th>Key partners</th>
<th>Key activities</th>
<th>Value proposition</th>
<th>Customer relationships</th>
<th>Customer segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key resources</td>
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<td>Cost structure</td>
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<td>Revenue stream</td>
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</table>

Table 1. Business model canvas.

First to identify the right data sets few of the smart City IoT platforms have been listed such as intelligent traffic management, smart lighting, smart health, which collection, smart environment, smart water supply, smart meter, and smart parking. These platforms have been thoroughly evaluated and out of these data sets, the data collected under these platforms have been narrowed down.

5. Business model

The approach that has been followed to identify the right data sets for the right customers to provide the right value through the right channel and that makeup to the whole business model.

Based on the segmentation the mass market it turns out to the retailers, consulting firms, application developers, telecom services, advertising companies, research companies, hospitals, and the niche market belongs to car insurance company, payment wallet companies, credit card companies, transporters, shopping malls, real estate developer.

To carry on further study with an example out of all these companies two of the companies from the mass market in two of the companies from the niche market have been identified. For the chapter the case of advertisement agencies has been considered as a targeted buyer.

After identifying the companies and the target segment, further, the right value proposition for each of the companies has been evaluated.

5.1 Customer segment and value proposition: Value proposition canvas

Since the study aims to establish a G2B system, the value proposition for each of the businesses will vary as per their requirement since every business is unidentical
and every business will have a unique set of requirements for their service to their clients. The value proposition will differ for each of the customer segments [30].

5.1.1 Value proposition: Advertising companies

The customer jobs of the advertisement companies are to look for an increase in awareness, wanted to have innovation in their products, to have the most profitable spaces, and retain customers also they wanted to stay up-to-date to stay ahead of their competitors and to capture potential target markets. The gains for the advertisement company would be to keep customer retention, innovation, to acquire new customers, and to have a strong network. The pains to achieve all this would be if the advertisement company acquire loss-making locations or if they had a hard time finding new markets. Also, extreme competition would be a pain and new entrants, wrong surveys, and time have taken processes to collect data is a pain.

The products and services that will be provided are area-based insights based on the data sets with an analysis tool through an interactive platform is to be provided for the assessment of areas by the company. This is assisted by backend services if opted for it. Gain creators would be analytics and tips to use analytics that for advertisement companies, the real-time data, the coverage area, and the pre-feed calculation modules will lead to gain and save time. On the other hand, pain relievers would be the product that would minimize the risk of failure, it is practical and visual and easy to use prefilled with applicable content accurate data and with real-time data collection.

There are also few unavoidable and addressable gains, customer jobs, and pains for advertisement companies like customer retention that is based on the competencies of the advertisement companies. Also is an extreme competition that they have to face on their own then the issue with a strong network and acquiring new customers also lies with the competency and the service provided by the advertisement companies to their customers.

Concluding the business model canvas, we can say value proposition is information as a service that is accurate, trusted, descriptive, and convenient for a customer segment that is advertisement companies that fall under mass segment as shown in Table 2 below.

Table 2.
Business model canvas: Value proposition for advertising agencies.
Before going it must be realized that out of the data sets that will be provided to these companies, not all the indicators or attributes would be useful for the advertisement companies. To evaluate what are the data sets and indicators are for specific use for the advertisement companies, a few data sets have been shortlisted on how to weight the most useful indicators that would be evaluated for the advertisement companies. Now there are a different number of indicators under each of the data set this like one IoT sensor collects a total of 12 indicators, Citywide Wi-Fi has a total of 38 indicators, electronic ticketing has a total of six indicators, smart poles have 38 indicators, multi-service digital caves have a total of 12 indicators. Based on this there are only a few indicators that would be packaged for the advertisement companies and the rest are of no use for the advertisement companies. The useful indicators make some portion of the total indicators in each data sets on evaluating that we would get the amount of leveraging the company or sell the advertisement company is getting over is data set. For example, under the first dataset, only 5 out of 12 data indicators are required, under city Wi-Fi only 3 out of 38 data sets are required, for electronic ticketing to out of 6, for smartphones 538, and for multi-service, digital gives 5 out of 12. This will help o.

Under this exercise we have determined the value proposition for the specific company and how your product can help this company to achieve its customer jobs also how much leverage that company is getting on our product.

5.2 Channels

Further evaluation of the business model, two types of channels is owned or it could be a partner channel or a combination of both. The own channel would be direct and on the other hand, the partner channel would be indirect. Under direct and we can have Salesforce, web sales on stores, and under indirect services, we can have partner stores or wholesales stores.

Show by comparing benchmarks of the services from AWS, Dawex, Quandl, and CMIE, all of these have their direct sales force and the product is sold through web sales since it is an intangible asset. It is not necessary to have physical resources concluding out the sales force would be there for the proposed business model with the help of web sales.

5.3 Customer relationships

There are distinct kinds of relationships that we could avail to our customers like personal assistance, customized dedicated personal assistance, self-service, automatic services like backend support from AI and ML or there could be blogs communities to help the customers. In AWS there is no dedicated personal assistance in the vertical of data exchange but they do provide rest of the services. In Dawex the only provision of personal assistance dedicated personal assistance to the large enterprises and self-services option for the most basic one and the rest are not provided. For Quandl there is an availability of automated service rest of the services are available based on the package type the customers are opting for. For CMIE only personal assistants and dedicated personal assistance are available for the customers. Concluding all the options since this data exchange would be in the critical and small stages it is recommended to have a personal assistance type of customer relationship also dedicated personal assistance to the large enterprise rest could be dropped. But in the future when scaling this data exchange, the rest of the type of customer relationships could be included in this data exchange.
5.4 Revenue streams

Revenue streams could be categorized in the sale of the assets, uses fees, subscription fees, renting for leasing of the platform, license to use the product, brokerage fees on the sales, or it could be through advertisement. Under the selected vertical in AWS, only the revenue is made on asset sale and the brokerage fee is also charged from the vendor that has to list its product on the platform. For Dawex do there is only use it brokerage fee for the big enterprises a subscription fee for the small and base packages to use the products. Also, there is a licensing fee to use the platform. In Quandl only subscription fees charged for the product used also the brokerage fees are collected from the vendors that are listing their products on this platform. In CMIE subscription fees are charged based on the type of user that could be categorized in companies or institutional packages.

Based on the above benchmarking it would be appropriate to charge only a subscription fee type of model in the earlier stages and later on added to the licensing brokerage fees when scaling up.

5.5 Key resources

Key resources could be physical, intellectual, human, and financial resources. In all the four cases all these aforementioned resources are required in all the cases, therefore, concluded that each type of resource is essential to make this business model viable.

5.6 Key activities

There are three types of activities that are production, problem-solving, or providing a platform or a network. Buy understanding of AWS it was found that all three key activities are there, i.e., production, problem-solving, and provision of the platform is there. In Dawex the only production of the data and platform network is present. Problem-solving is a key activity is not there since it is operating to provide data not prescriptive or predictive analysis. Quandl has all three key activities just like AWS and CMIE does not have a problem-solving feature. It only has the production and provision of a platform network to provide the service. Inference to that these business models, concludes the production. That would be provided over a network hence the activity would also include the provision and also the packaging is based on the prescriptive and predictive analytics therefore problem-solving component would also be included in this business model.

5.7 Key partners

This has a breakdown in 4 types of partnerships. The first strategic alliance between the non-competitors, and corporation that would be a strategic partnership between competitors. The third is joint ventures to develop new businesses and products. Fourth is the buyer–supplier relationship to sure reliable supplies of the product.

In AWS we have only a strategic alliance between competitors and buyer–supplier relationships. In Dawex to the buyer–supplier relationship does not exist, the rest of the options are present. In Quandl there is no corporation or strategic partnership between competitors rest of the options of key partnership types are present. In CMIE there is no sort of key partnership is involved. Inference in this there could be a strategic alliance between non-competitive sort of partnership in the early stages of
the business model. Also, the buyer–supplier relationship to have the supply of raw
data into the system. The rest of the options are not recommended based on the risk
involved.

5.8 Cost structure

Aforementioned shortlisted the key resources that are physical, intellectual,
human, and financial will account for a cost. For physical this could be the infra-
structure required to run these operations on intellectual sides we need licenses
permissions brand and the raw product. For human resources, there would be salaries
and insurances. Also, there would be a maintenance cost of the digital platform,
background services, and sales marketing.

Collating all the exercises that we have mentioned above we have concluded a busi-
ness model for advertising consulting firms based on the concluded business model
components as below in Table 3.

Table 3.
Showing derived business model for advertising consulting firms.

6. Conclusion

The data exchange businesses shall always be value-driven since data is an
intangible asset the information shall hold the value for the customer. If data is not
valuable and distinct to the customer then there is no unique selling proposition in
the product. Data exchange is an expensive operation so most of the services can be
outsourced as there is a cheaper option available outside to outsource the businesses
rather than having again in house setup.

Creating industry specific data insights by leveraging the data capturing ability of the
smart cities and further monetizing the same will be a win – win proposition for gov-
ernment and private entities. But caution needs to be exercised with respect to privacy
breach. It is particularly essential for India, as cities are trying to automate their delivery
of public infrastructure by introducing interconnected Pan City Smart Technologies
under the Smart Cities Project by producing huge volumes of data. Meeting digital
infrastructure’s operating and maintenance costs, measured at 15–20 per cent of capital
annually, would be a challenging task unless we identify a revenue model [16].
This system will not only help government to increase its efficiency for public operations and ease on financial support but also will help business to optimize, generate and expand new services while staying ahead of competitors. The transformation of the new open-data model into a data monetizing system creates a tremendous opportunity for all the stakeholders and a motivation for city officials to collect and feed appropriate data into the system.
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