

Design of Bandung Raya Light Rapid Transit (LRT) Business Model Using Business Model Canvas Framework

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Abstract. Congestion is one big problem in Bandung city, and it is expected to be reduced by LRT Bandung Raya construction. LRT Bandung Raya, which is planned to be built in 2019 and completed in 2021, will be operated by PT Len Industri, a technology company which has experience in transportation signalling but is a new player in LRT business. The investment needed to accomplish this project is huge, and it has consequence on the price of the ticket. PT Len Industri needs to find other alternatives of revenue streams from LRT Bandung Raya to lowering the price of the ticket to make it accepted by customers and to make the business sustainable in the future. Alternatives of revenue streams can be created by building synergies between all resources of PT Len Industri by considering the trend of changes in the business environment, including the technological development and the spill-over effect from the construction of the LRT, and by considering also the customer profiles. This research aims to design the business model of PT Len Industri's LRT business using the business model canvas framework. This research starts with mapping the internal condition of PT Len Industri, continued with customer profiling, which followed by business environmental analysis. The next steps are SWOT analysis, value proposition design, and design of full business model canvas. The result of this research is the business model for LRT which highlights the new alternatives of revenue streams and their consequences on other blocks and cost structure

Keywords: 1 Business Model · 2 Business Model Canvas · 3 LRT · 4 PT Len Industri · 5 Revenue Streams

1. INTRODUCTION

According to Bintarto (1997), a city is a network system of human life that is characterized by high density and coloured by heterogeneous socio-economic strata with a materialistic pattern or can also be interpreted as a cultural fortress caused by natural and non-natural elements with symptoms of a large concentration of population with a heterogeneous and materialistic pattern of life with the area behind it.

Until 2018, Indonesia has 98 autonomous cities spread from west to east and Bandung is one of them. According to data from the Central Bureau of Statistics, in 2016 Bandung has total population of 2,490,622 (<https://bandungkota.bps.go.id>). With an urban population of that size, the city of Bandung only has angkot and Trans Metro Bandung buses as providers of public transportation services. There are some problems with angkot: they stop at improper sites, and, lack of comfort of the fleet because of uncertain schedule, heat, cigarette smoke and dirty interior, which create reluctance to use them, and this increases the number of private vehicles in Bandung. According to BPS West Java Province, the number of two-wheeled and four-wheeled vehicles in the city of Bandung in 2016 is 1,716,698. This number does not include the vehicles from neighbouring cities and districts such as Cimahi City, West Bandung Regency, and Bandung Regency. The result of this is congestion. This situation encourages the development of a public transportation system that can provide convenience, comfort, security and create a culture of patience and queuing for the people of Bandung.

Considering all of the transportation problem in Bandung, PT Len Industri intends to develop a public transportation system that can serve the public in Bandung City and Bandung Regency. The experience of PT Len Industri, which contributed to the Jakarta LRT development, can be used as the basis for designing LRT business in the city of Bandung.

Developing the LRT needs huge investment. Revenue for all stakeholders cannot depend solely on LRT ticket sales due to this high cost. As reported by Kompas.com, the cost of building the Palembang LRT is 484 billion rupiah per kilometer. If all of the costs will be recovered from selling the ticket, the price of the ticket will be too expensive. Therefore, it is necessary to find other revenue streams for this project. Changes in revenue streams definitely will change the other aspect(s) of the business, that needs to be considered since the very beginning. In this case, there is a need to develop a business model to make a more effective planning process. PT Len Industri needs to design a business model so it can create, deliver, and capture value for the customers in a better way.

This research focuses on the development of Bandung Raya LRT business model using Business Model Canvas framework. The work started from collecting data about the internal condition of PT Len Industri, customer profiles and business environment. These data are used to accomplish the SWOT analysis to define the strategies, including strategies for value proposition. The next step is designing value proposition, followed by designing the whole business model canvas.

2. METHODS AND RESULTS

2.1. Company Internal Data

PT Len Industri is an electronics and technology company, which was founded in 1965 and headquartered on Jl. Soekarno-Hatta No. 442, Pasirluyu, Regol, Kota Bandung. Initially PT Len Industri was part of the Indonesian Institute of Sciences (LIPI) and had an acronym namely the National Electronics Institute (LEN), and later transformed into a state owned company or BUMN in 1991. Since then Len is no longer an extension of the National Electrotechnics Institute (LEN), but it has become a professional business entity with the name PT Len Industri. At present, PT Len Industri is under the coordination of the Ministry of BUMN with 100% share ownership by the Government of the Republic of Indonesia. Related with railway transportation, PT Len Industri has a subsidiary engaged in this field, namely PT Len Railway Systems (LRS) which was established in 2012 to meet various kinds of needs in the railway sector. The other business lines of PT Len Industri are electronics for defence, renewable energy especially solar systems, ICT devices and navigation systems (<https://www.len.co.id>).

2.2. Customer Profile Data

According to Osterwalder (2014), customer profile describes the customer segment(s) to be addressed. In this research, there are two customer segments. The first is the individuals of Bandung city population who need transportation modes to move from one point of place to other places. The second group of customers are companies who might use the resources owned by PT Len Industri for their business operations, such as for advertising. Customer profiles consist of jobs, pains, and gains. Customer jobs mean what customers trying to get done in their work and lives, pains mean bad outcomes, risks, and obstacles related to customer jobs, and customer gains

mean the outcomes or benefit customers seek. Table 1 describes the profile of Bandung Raya individual customer, and table 2 describes the profile of companies.

Table 1. Customer Profile for Individuals

Customer jobs	<ol style="list-style-type: none"> 1. Travel from place of origin to destination; and 2. Make payment transactions.
Pains	<ol style="list-style-type: none"> 1. The condition of public transportation is not comfortable: there is no cooling, there is cigarette smoke, the interior of public transport is dirty and slums, and the number of buskers and beggars who enter; 2. The conditions of the sidewalk are not convenient: damaged (hollow and muddy), the median sidewalks are narrow, and there are not even sidewalks that can be used to reach the nearest public transport stop. Some sidewalks are also converted into a place to sell, making it difficult to pass; 3. Public transportation operates on the same road as private vehicles so that it is also affected by congestion, which impacts on the timeliness of public transport; 4. The condition of bus stops or stations are not good, such as damaged seating; and 5. The level of security of public transport conditions is still low.
Gains	<ol style="list-style-type: none"> 1. Traveling more efficiently by avoiding traffic jams; 2. More economical costs for traveling; 3. The route that suits the trip; 4. Safe and comfortable conditions from the initial destination until arriving at the final destination of the trip; and 5. Contribute to reduce pollution.

Table 2. Customer Profile for Companies

Customer jobs	<ol style="list-style-type: none"> 1. Providing goods or services for public; 2. Minimizing operational costs; and 3. Obtain profits.
Pains	<ol style="list-style-type: none"> 1. Installation of cables and underground pipes that are more difficult because they have to dismantle the land and clean it up when it's finished; 2. Vulnerable to damage for underground cable and pipe installation if there is a new installation and / or dismantling of cables and pipes; 3. It is difficult to know the physical condition of cables and pipes in plain view because they are underground; and 4. Expensive billboards lease for advertising.
Gains	<ol style="list-style-type: none"> 1. Installation of cables and underground pipes that are more difficult because they have to dismantle the land and clean it up when it's finished; 2. Vulnerable to damage for underground cable and pipe installation if there is a new installation and / or dismantling of cables and pipes; 3. It is difficult to know the physical condition of cables and pipes in plain view because they are underground; and 4. Expensive billboards lease for advertising

2.3. Business Model Environment

The next step is business model environment analysis. The business environment elements are grouped into four categories: key trends, industry forces, market forces and macroeconomic forces. Every element could be opportunity or threat.

There are some factors of environment in key trends group that might influence the business, those are: 1) moving block signaling system, 2) more concern on reducing pollution. Indonesia has commitment to reduce carbon emissions to 29% in 2029-2030 (COP, 2015), 3) increasing government commitment on development of electric car as indicated by the issuance of Presidential Regulation on electric vehicles, and development of electric vehicles supporting systems including construction of Stasiun Pengisian Listrik Umum (SPLU) or Public Electricity Charging Station. In 2035, based on BPPT prediction (Kendaraan Listrik, 2018), there will be 5,700,000 electric vehicles in Indonesia, 4) increasing awareness of building better culture in the community, including in transportation, 5) high level of local content or TKDN on INKA-made carriages. The next group is market forces, and the factors are: 1) increasing population of Bandung Raya, 2) the need to reduce the loss of the community due to congestion, 3) uncomfortable public transportation conditions and the need to improve it. In the next group, the industry forces, the factors are: 1) domestic industries that are ready for production, 2) PPP funding, 3) construction of Transit Oriented Development in the station areas, 4) replacement services in the form of public transportation by buses, online motorcycle taxis, and taxis, as well as existing rail transportation operators. In the macro-economic forces category there are: 1) low inflation, 2) stable foreign exchange rates, 3) the potential for foreign loans, 4) abundant labor, and 5) national government budget (APBN) and local government budget (APBD) allocations for infrastructure.

2.4. SWOT Analysis

After collecting data, a SWOT analysis is then carried out so that the best strategies will be found. The SWOT analysis result can be seen in table 3.

Table 3. SWOT Analysis

Strengths (S)	Weaknesses (W)
1. Status as a State Owned Enterprise	1. Investment needed in LRT projects is very huge
2. Companies engaged in technology and electronics.	2. Pricing of tickets is potentially expensive
3. The availability of subsidiaries and business units for transportation at PT Len Industri.	3. Requires land acquisition.
4. Corporate centers located in Bandung to facilitate easier coordination with LRT Bandung Raya.	4. Transportation management is not the main domain of PT Len Industri.

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5. Allocation of APBN and APBD is large for infrastructure projects.
 6. Domestic industries are ready to supply carriages and other railway equipment.
 7. Experience of PT Len Industri in railway built from other LRT developments.

Opportunities (O)	S-O Strategy	W-O Strategy
<ol style="list-style-type: none"> 1. Availability of a vast public transport market due to existing public transportation conditions and road congestion. 2. Availability of technology to provide public transportation that is environmentally friendly 3. Utilization of Presidential Regulation on electric vehicles to explore new revenue streams 4. Utilization of Bandung Raya LRT as income revenue through TOD and other alternative revenue streams. 5. Building a culture of discipline and queuing for the people of Bandung. 	<ol style="list-style-type: none"> 1. Utilizing the status of SOE and the current government supports on infrastructure development to build a reputation for the transportation and resource management business with a very broad market. (S1 + S3 + S4 + S5 + S6 + S7 + O1 + O2 + O4 + O5) 2. Utilizing electricity as a revenue channel with the existence of the Electricity Vehicle Regulation that will be issued by the government. (S1 + S2 + O2 + O3) 3. Combining cooperation between SOEs to support Indonesia's GDP so as to increase public trust in the government. (S1 + S3 + S6 + O3) 4. Combining resources to create alternative revenue streams. (S3 + S7 + O3 + O4) 	<ol style="list-style-type: none"> 1. Utilizing the use of TOD and revenue streams as much as possible to attract a very broad market so that the investment disbursed can be quickly closed. (W1 + W2 + W3 + W4 + O1 + O2 + O3 + O4) 2. Providing good service and disciplined rules for the people of Bandung so that they can make public transportation more organized. (W4 + O1 + O5)

Threats (T)	S-T Strategy	W-T Strategy
<ol style="list-style-type: none"> 1. Other rail-based transportation operators appointed by investors / regional governments (eg. PT KAI). 2. Other public transportation that is more comfortable, safe and inexpensive according to the people of Bandung. 	<ol style="list-style-type: none"> 1. Demonstrate the seriousness of PT Len in the LRT business by making its own subsidiary to manage and company hub located in Bandung. (S3 + S4 + T1 + T2) 2. Get large financial support from the government compared to competitors. (S1 + S4 + S5 + S6 + T2) 	<ol style="list-style-type: none"> 1. Coordination with public transportation in other Bandung cities, such as Trans Metro Bandung, angkot, even local Bandung trains as feeders for LRT. (W4 + T1 + T2)

2.5. Value Propositions

Value proposition is a main block in business model. Value proposition is the reason why consumers switch from one company to another so that they can solve their problems and satisfy their desires. Value proposition maps for individuals and companies can be seen in figure 1 and 2.

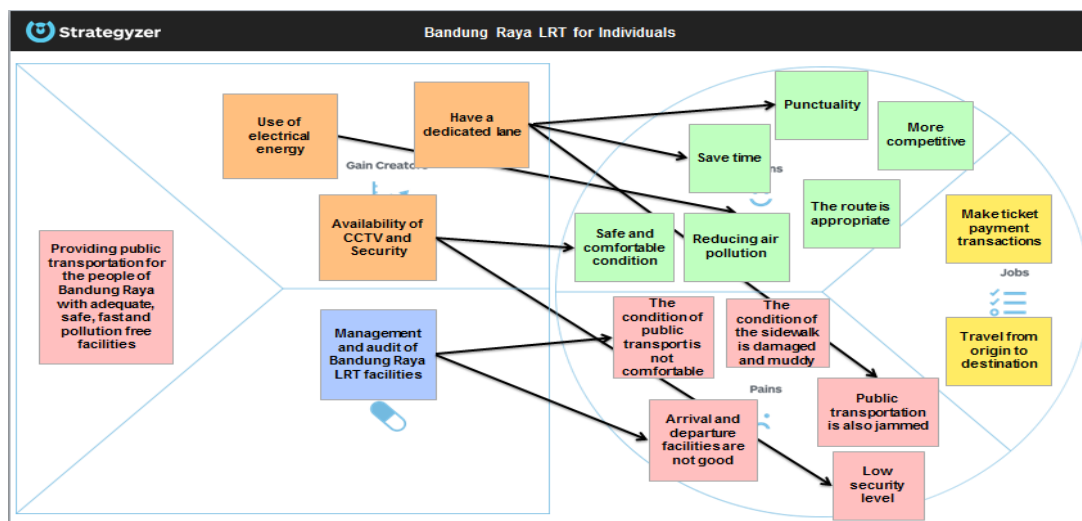


Figure 1. Value Proposition for Individuals

As can be seen in Figure 1, fit customer profile and value proposition for Bandung Raya community can be broken down into the following two points.

1. In the gain creators section there is the use of electrical energy which can be a solution to reduce air pollution during rush hour gains. Furthermore, there is the operation of CCTV and the existence of security which is the solution for safe and comfortable conditions gain and low level of security of other public transportation pain. The position of LRT that is above the ground by having its own lane is also a solution for the punctuality of LRT and time savings gain, also faster from other existing public transportation that are frequently exposed to traffic jams pain.
2. In pain relievers, it is proposed to have management and audits to ensure the comfort and maintenance of each LRT carriage, rail infrastructure, and signaling system and transportation facilities such as stations and TOD areas pains.

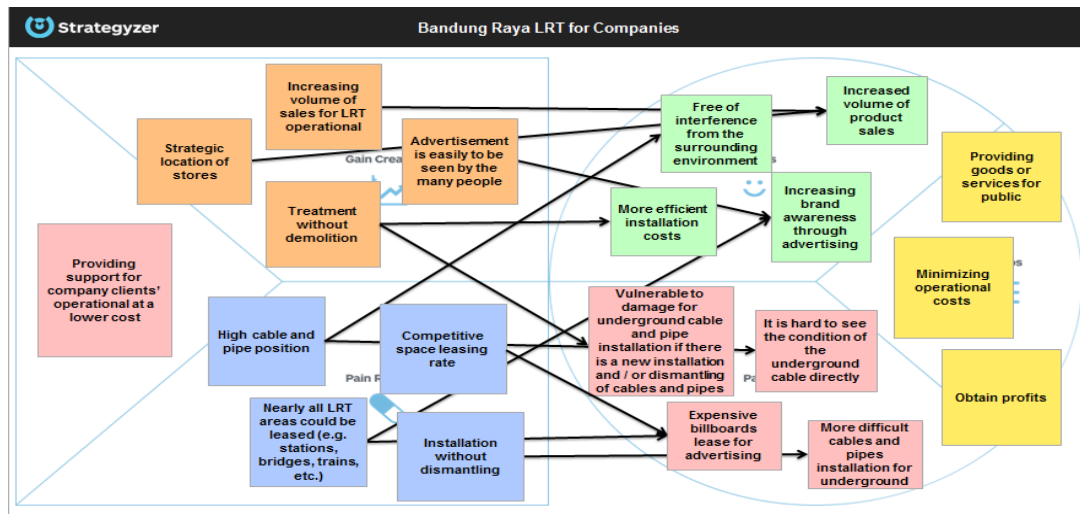


Figure 2. Value Proposition for Companies

As can be seen in Figure 2, the fit of the customer profile and value proposition for the company can be broken down into these two points.

1. In the gain creators section, there are strategic location of stores and increasing volume of sales for LRT operation that can increase the volume of product sales for companies gain. Increasing volume for LRT operation might happen because the products that will also be used for LRT operations. In addition there is treatment without demolition which can result in lower installation costs and maintenance costs that are more efficient compared to underground installations due to the condition of cables that can be seen directly and maintenance is not as difficult if the installation is done underground. Maintenance without demolition is also a solution to the damage caused by demolition which sometimes occurs when other companies want to dismantle their assets which sometimes caused incidents that could damage other company's assets. The last gain creators is advertisement is easily to be seen by the many people that could be the solution for increasing brand awareness through advertising gain.
2. In the pain relievers section there's high cable and pipe position which are the antidote for this vulnerable to damage for underground cable and pipe installation if there is a new installation and / or dismantling of cables pain and free of interference from the surrounding environment gain. In addition, there is an installation without dismantling which is the antidote to more difficult cables installation for underground pain. The last pain relievers are competitive space leasing rate and nearly all LRT areas could be leased (e.g. stations, bridges, trains, etc.) which are the antidote for expensive billboards lease for advertising pain and increasing brand awareness through advertising gain.

2.6. Proposed Business Model Canvas

The following is the result of the proposed business model canvas (BMC) which has been assessed by seven questions of the business model made by Alexander Osterwalder. This BMC has two coloured sticky notes. Yellow colour for individuals and green for companies.

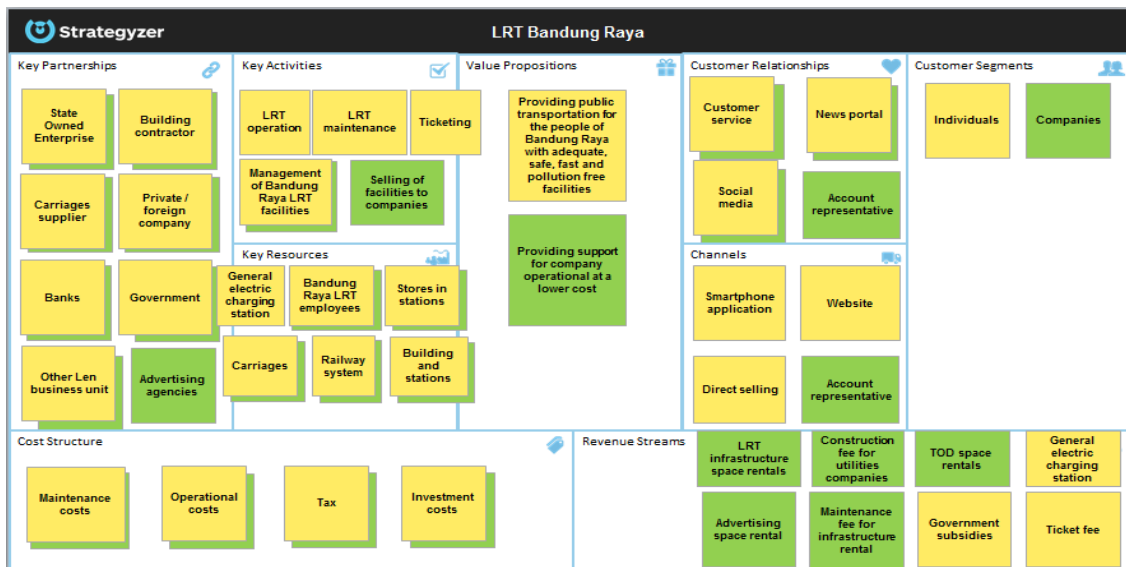


Figure 3. Value Proposition for Companies

Table 4. Proposed Business Model Canvas Explanation

Block	Explanation
Customer segments	The customer segments targeted by Bandung Raya LRT are divided into two groups: individuals and companies. Individuals include all population who use the facilities, e.g. students, employees and tourists. The population around the area of corridor 1 is about 1,083,115 spread in 13 sub-districts. Company segment of customers are the ones who uses LRT infrastructure in their operation to deliver its products to the community - such as PLN and Telkom, or to increase brand awareness of their products to their customers by using LRT space as advertising media, and the companies who rent space in TOD to sell their products.
Value propositions	Bandung Raya LRT have value propositions for each group of customers. First is providing public transportation for the people of Bandung Raya with adequate, safe, fast and pollution free facilities for individuals customer segment. Second is providing support for company clients' operational at a lower cost for companies customer segment.
Channels	Information and promotions regarding Bandung Raya LRT are available on various platforms such as applications and websites. Individuals customer can paid the ticket fees by tapping the card directly at the station. While, companies are reached by account representatives from Bandung Raya LRT
Customer relationships	Customers can make criticisms and suggestions via customer service by using application, official website of the Bandung Raya LRT and at stations. In addition, there are also news portal and social media, so both customer segments could get the latest information from Bandung Raya LRT. There is also account representatives for companies customer segment.
Revenue streams	<ol style="list-style-type: none"> 1. The main revenue of Bandung Raya LRT comes from cashless ticket sales 2. Government subsidies is expected at certain periods so the offered price is not so expensive. 3. The other opportunity for revenue stream is installing solar panels at each LRT station. This solar panel - one of Len business units is solar energy - can be used for SPLU suppliers which can be made at several stations, expecting the increase of electric vehicle users in the future after ratification of President Regulation of electric vehicles. 4. PT Len Industri can work with other companies to advertise on the Bandung Raya LRT infrastructure, the inside and outside of the station and also the interior and exterior of the trains 5. Bandung Raya LRT can also integrating LRT stations with shopping centers and commercial areas to increase the flow of passengers who are riding. This utilization can also overcome the narrow land of

Bandung City as also done by Hong Kong and Singapore.

6. In addition, Bandung Raya LRT can also lease its LRT lines for the installation of electrical cables and optical fiber. This rental can minimize costs for PLN and Telkom for maintenance because the conditions can be seen in plain view and far from vandalism disorders which means reduced risk. PT Len Industri can also charge fees for the installation of cables and maintenance costs

Key activities	The main activity carried out by PT Len Industri as an operator is operating public transportation facilities for the people of Bandung Raya, LRT maintenance and ticketing for individuals customer segment. Selling of facilities activity is done for companies customer segments. Last, management and the operation audit of Bandung Raya LRT including installation and maintenance of advertisements and cables that are installed at LRT infrastructure, LRT bridges, and stations are done for both customer segments.
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Key resources	The key resources of Bandung Raya LRT are Bandung Raya LRT employees and general electric charging stations which are used by individuals customer segments. Another key resources are stores in stations, carriages, railway system and building and stations which are used by both of Bandung Raya LRT customer segments.
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Key partnerships	The main partner of Bandung Raya LRT is state owned enterprises such as PLN as an electricity supplier and PDAM as a distributor of clean water, INKA as a distributor of carriages, contractors to build LRT infrastructure, banks as top up balance service providers for tickets and loans - might be supported also by foreign debt - to built Bandung Raya LRT, and the government of West Java and Bandung as providers of development and operation permits. Last, there's advertising agency that could provide advertising material for companies customer segment to be installed in Bandung Raya LRT areas.
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Cost structures	The cost structure of Bandung Raya LRT is the fleet maintenance costs for LRT infrastructure, carriages and locomotives, and the railroad systems. Operational costs include employee wages, electricity and water usage costs. There are cost of leasing land to the Bandung City Government if PT Len Industri using leased land to be used as TOD. Last, there is a cost for investment. All of these cost structures apply to both customer segments.
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