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Business Model Innovation in Railway Industry for Emerging Market

- A Case Study on Bombardier Transportation

Master of Science Thesis

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Abstract

The transportation industry has evolved tremendously over a period of time. With current development of technology, uneven transportation development across the world, urbanization, energy issues, and climate concerns, transportation industry is undergoing fast development and restructuring. As a current leading player in the railway transportation industry, Bombardier Transportation (BT) is actively seeking opportunities including new Business Model (BM) setup to stay as future leader. This project serves the purpose to investigate a) what the current trends and opportunities are in the transportation industry, b) what relevant resources and capabilities of BT will be required to appropriate the opportunity; and c) what a possible new Business Model setup is that BT could adopt to capture value from a market, whose characteristics are different from existing market.

In order to answer these research questions, a market study, interviews and brainstorming sessions were conducted. To map out the element of BM, Osterwalder's (2004) Business Model framework was applied. For modern transportation industry, main trends include intelligent transportation system, intermodal system, efficient transport, cost concern, passenger safety focus, and personalized transport system. Opportunities raised from these trends for BT includes to become intelligent transportation system provider, financial service provider, audit service provider, management and operation consultancy provider, last but not least, rail mobility provider to emerging market, which was developed further in this study. One possible new business model setup was investigated and presented catering the emerging countries where transportation is immature and in demand for economic development.

Key words: Business model, Transportation industry, Railway mobility, Emerging market

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Abbreviation and Dictionary

ADB: African Development Bank

BP: Business Partner, a branch within BT HR function

BRIC: Brazil, Russia, India and China

BOS: Blue Ocean Strategy

BT: Bombardier Transportation including all the divisions and functions

CAGR: Compound annual growth rate

CCR: Chief Country Representative

CoE: Centre of Expertise, a branch within BT HR function

CSR: Corporate Social Responsibility

EBITDA: Earnings before interest, taxes, depreciation, and amortization

IMF: International Monetary Fund

Partnership: All the investors/partners who invest in the new BM setup, and will be the owner of the railway system that provides the rail mobility.

PGR: Passenger Division in Bombardier Transportation

R&C: Resources and Capabilities

RCS: Rail Control Solution in Bombardier Transportation

SER: Service Division in Bombardier Transportation

SSC: Shared Service Centre, a branch within BT HR function

SYS: System Division in Bombardier Transportation

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1 Introduction

In this section we look into the background of the transportation industry, changes in the competitive landscape and introduce the problems faced by Bombardier transportation

1.1 Background

The purpose of this project is to investigate and identify new growth opportunities that can be pursued by Bombardier Transportation (BT) using and expanding its existing resources and capabilities. BT, whose predominant markets are North America and Europe possess resources and capabilities to deliver all the products and services required for developing and operating a railway system. But for BT to maintain its leadership in the industry, they will require new avenues of growth. In order to do this project will identify the market opportunities that will be available, understand BT resources and capabilities and formulate a business model, which would help BT in capture value from the new business model.

BT as a company has benefitted from its inception in 1970's to date with the growth of European railway market. The growth in rail transportation has translated into both economic and environmental benefits for European countries. A rail network with good connectivity helps in reducing the pollution, cost of transportation and reduces travelling time (Litman, 2011). Such a rail network majorly consists of trains, which run between two cities or tram network within a city, or the shuttle services used between airport and the city.

A set of factors affect the current state of rail transportation system in place today and determine trend of the industry for its future state UNIFE (2010). These include population of the country, economic growth, energy and environmental concern, technology development, social behaviour change and urbanization, demographic change, globalization and migration and the increasing concern primarily influences the growth of rail network over traffic accidents. All these influencing factors are applicable to most of the countries across the world.

While the turnover of the industry has risen (ibid), there have been dramatic changes in the competitive environment for the industry. But the competition is not just restricted within the railway industry. The rise of budget airlines; logistic service providers, such as FedEx and DHL; integration of urban transportation system including bus, tram, underground, and suburb trains, etc has contributed towards the changes in competitive environment. The economic growth coupled with competitive environment helped in creating a healthy ecosystem of overall transport industry within Europe. Such an ecosystem helped in growth of firms involved in the business as well contributes to growth of country.

1.2 Industry players

The major stakeholder's involved in the transport industry are the government agencies, manufacturers of transport system and its suppliers, end users, fleet operators, infrastructure providers, consultancies, etc. Government agencies are responsible in formulating the policy governing the transport industry. The major areas that are

covered under such policies are amount of investment, nature of investment i.e. public-private partnership, distance of road and rail, technology transfer etc.

There are more than 400 companies across the world dealing with manufacturing of public transportation systems (Data Monitor, 2010). These manufacturers cater the requirement of the industry by providing required product and services. The products range from trains, buses, signalling and ticketing systems. The services offered by industry players range from product maintenance to day to day operational services of transport network, which enable efficient working of these networks.

Such networks are owned and operated by government agencies or public-private partnership or by private operators itself. The public-private partnership helps in reducing the financial burden on government agencies. The role of user and their ability to influence the system are minimal in this industry.

1.3 Current situation

The forces, which affect policy decision, are the macro-economic factors of any given country. Factors such as population, urbanization, economy, energy, demographic changes and existing infrastructure play a vital role in such policy formulation. Europe and North America are currently witnessing reduced spending on infrastructure. The reason that these countries are experiencing no population growth after 2015 (Eurostat, 2008), moderate growth in economy, change in the demographics of people such as 30% of the population will be in age group of 65 by 2060 (Antonio Tajani, 2009) (Cruz & Serinsky, 2008). On the other hand countries like Brazil, India and China are experiencing rapid urbanization. It is estimated that by the year 2030 around 5 billion people will be living in cities in these countries (Thoraya Ahmed Obaid, 2007).

Due to these reasons, the EU and North American regions are experiencing modest economic growth. On the other hand, the Asian, African countries are witnessing rapid growth in their economy (Data Monitor, 2010). The rapid growth of Asian, African economy leads to increased demand for transportation related products and services in those markets. And the decline of EU and North American market puts more emphasis on cost cutting and optimization. These factors coupled with energy crisis create demand for more energy efficient transport system. Since these factors are of national importance, there exists strong government intervention in the functioning of this industry.

Apart from macro-economic factors, there are factors that affect the industry players globally. These factors include financial crisis, globalization, climate changes, safety and security. The recent financial crisis has resulted in markets melt down in Portugal, Greece and Iceland. This situation is due to fiscally unsustainable policies in some countries, delayed repair of the financial system, insufficient progress in establishing the discipline and flexibility needed for a smooth functioning of monetary union (IMF, 2010). Climate concerns have prompted many nations to cut their green house gases (GHG). According to United Nation's framework convention on climate, initiatives are being taken across the world to reduce the GHG by almost close to 40% (UNFCC, 2011).

1.4 Problematization

The factors such as shift in heightened economic activity from Europe and North America to Asia and Africa coupled with stiff competition from within and outside the industry are affecting the firms, which were previously focused on Europe for their growth. This mandates a need to explore new growth and profit opportunities in order to sustain business growth. If such a search for growth opportunities is broadened to encompass the overall transportation industry, then potential opportunities will be very high, when compared to just railway industry, in which BT is currently focussed. For this purpose the first research question was developed.

RQ1: *What are the current trends and opportunities in the transportation industry?*

Upon analysing the current industry trends, it was identified that apart from Asian growth story, there are tremendous growth opportunities in four different areas. They are intelligent transport system, financial services, audit and advisory services and development of railway infrastructure and services in Emerging markets outside Brazil, Russia, India and China (BRIC). Such markets hereafter are referred as just emerging markets. BRIC countries are excluded in this study due to the recent development of railway industry together with their economic development. They are becoming established markets for BT.

Among all these opportunities the development of railway infrastructure and services in emerging markets was identified for further exploration. For example, currently African governments and private sources are investing close to 72 billion USD on infrastructural projects every year. And the combined African markets GDP is bound to reach 2.6 trillion USD by the year 2020 (al, 2010). Entering such markets will enable the first mover advantage in a potential future market and also gain customer's loyalty for BT, which is of high importance in this industry. This move will also enable BT to offer more services than just selling products. This shift from selling products to selling service enables long-term revenue source and might also ensure business sustainability.

In order to appropriate the railway business opportunity in emerging market, BT should possess required resources and capabilities for execution of the project. In order to understand the BT's existing resources and capabilities research question two was developed.

RQ2: *What relevant resources and capabilities of BT will be required to appropriate the "emerging market" opportunity?*

There are considerable hurdles in appropriating this opportunity in the emerging markets. Governments in such markets lack financial strength required for investing in big-ticket infrastructure projects. Apart from that they also lack the capabilities required for operating and maintaining the system efficiently. In order to convert this hurdle into an opportunity, there is necessity to change the way BT approaches the market. The existing practice of selling products like trains, signalling system and services to customers in emerging markets is not a viable business model. This mandates us to develop an innovative business model, which will make use the existing resources and

capabilities of BT and still be able to cater the needs of emerging market, and this is answered by exploring the third research question.

RQ3: *What is the new possible Business Model setup that Bombardier could adopt to capture value from a market, whose characteristics are different from existing market?*

1.5 Report structure

The approach adopted in answering the research question is reflected in the way the report is structured. Refer to the figure 1 below.

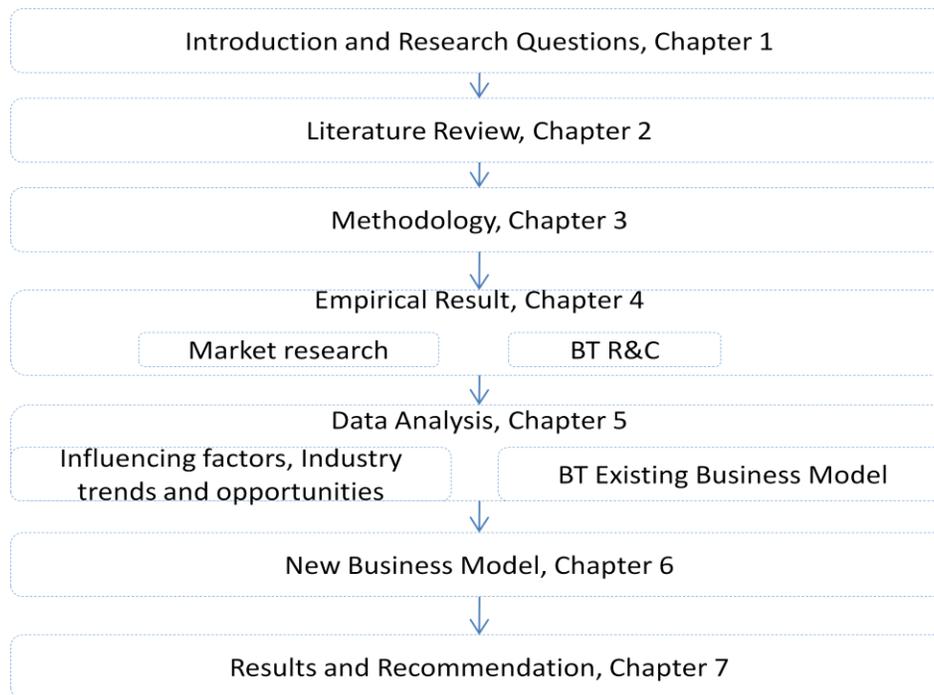


Figure 1: Content Logic of the Report

Literature survey presented in Chapter two was performed to understand ways to identify growth opportunities. This helped in delineating the methodology for this project. The approach adopted executing this project is described in chapter three.

This is followed by Empirical result in chapter four. Data collection was used to collect both primary and secondary data. Primary data collection deals with interviews conducted within BT to understand its resources and capabilities. The details of the interviews can be found in Appendix I of this report. Secondary data collection is carried out through market research using Internet and from Bombardier internal documentation. The findings are presented in two different section titled as “Bombardier transportation R&C” and “Market research” within chapter four.

Chapter five of this report presents the analysis of data collected in pervious chapter. This helped in identifying the opportunities and mapping the existing business model of BT. Chapter six explains the new business model which was developed to appropriate the opportunities identified in the previous chapter. Results and recommendation are presented in chapter seven.

2 Literature review

In this section, we look into literatures that would help us in identifying the factors involved in developing a new business model for its future sustenance

For a successful new business model, there is a need to understand and analyse BT, the industry in which it operates and the environment. First in this chapter we study literature on strategy, paying special attention to Porter's Five Forces and competitive positioning. This is followed by theories of resources and capabilities (R&C) and dynamic capabilities. The understanding of R&C will help in sketching the existing business model. After this, study of sustainability is performed. The knowledge gained through sustainability along with R&C will help in formulating the new business model and identify opportunities. As an alternative exploratory approach towards new Business Model development, Blue Ocean Strategy literature study is reviewed and presented. Detail findings of the literature study are presented below.

2.1 Strategy

Originated from Art of War, strategy in business context often is related to positioning. As defined by the strategy guru Michael Porter (1996), "strategy is the creation of a unique and valuable position, involving a different set of activities". Good strategy should lead to competitive advantage for the business in any industry environment. There exist five different competitive forces, which shape such industries competitiveness (Porter M. E., 2008), as shown in the figure 2.

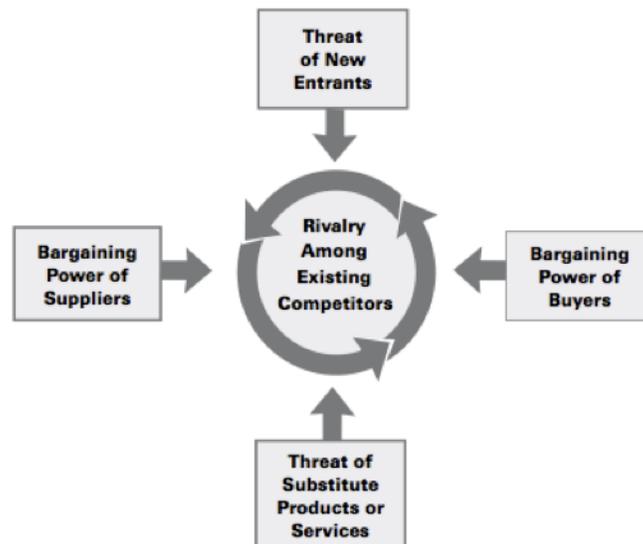


Figure 2: The Five Forces that shape industry competition (Porter M. E., 2008)

Porter argues that the five forces characterize industry structure and determine all firms' profitability in the entire industry (ibid). Second to the industry structure, companies' position in the industry is another determinant of probability. Firms that possess optimal position in a low-profitable industry could also strive and obtain superior returns. To reach a competitive position, Porter proposes that a firm's strength must fall in two dimensions: cost and differentiation. And three generic strategies that

any firm could adopt are: cost leadership, differentiation or focus. (Porter M. E., 1985)
 The figure 3 illustrates the different strategies.

		Competitive Advantage	
		Lower Cost	Differentiation
Competitive Scope	Broad target	1. Cost Leadership	2. Differentiation
	Narrow target	3A. Cost focus	3B. Differentiation Focus

Figure 3: Porter's Generic Strategies (Porter, 1985)

As the mainstream strategy theory in academic and practice, there have been also some critics on Porter's arguments. Applying game theory, Brandenburger and Ballebuff (2000) identify a 6th force that shape strategy: complementor, arguing the important role complementary products and their developments on the focal firm. Some other scholar put the national culture (Bosch & Arno A. van Prooijen, 1992) as the additional important force shaping industry.

Porter's model also has been criticized for the static industry argument. Disagreeing with Porter, there exists wide range of articles that discuss strategic decision making in fast moving industries (Christensen & Joseph L. Bower, 1996); (McGrath, Ian C. Macmillan, & S. Venkataraman, 1995); (Eisenhardt K. M., 1989); (Wiltbank, Nicholas Dew, Stuart Read, & Saras D. Sarasvathy, 2006); (Bhide, 1986)). And these cases are against the stability assumption that Porter made in framing his arguments. Last, it is not feasible to discuss about positioning overlooking the firm's internal resources and capability in its offering, especially the dynamic capabilities that companies need to possess in the fast moving industries. This kind of strategy development is known as Structuralist strategy according to Mauborgne & Kim (2009), where one assumes that the operating environment is given and develops strategy by understanding the environment in the industry operates, also referred as Red Ocean.

The alternative approach in developing is known as Blue ocean strategy (BOS) or Reconstructionist strategy, where firms seek to shape the environment with their strategy (ibid). Here the effects of competition are less compared to Porter's view. Success of such approach depends on three propositions: value proposition, profit proposition and people proposition. The alignment in the structuralist approach is towards either low cost or differentiation. But in BOS approach, both low cost and differentiation is pursued simultaneously (ibid).

For the formulation of BOS, strategy canvas and the four-action framework are used as shown in figure 4. The strategy canvas helps in identifying the current state of the competition by mapping the competing forces. Once this is done four-action framework is used to eliminate, create, reduce and raise the new and existing factors (Kim & Mauborgne, 2005).

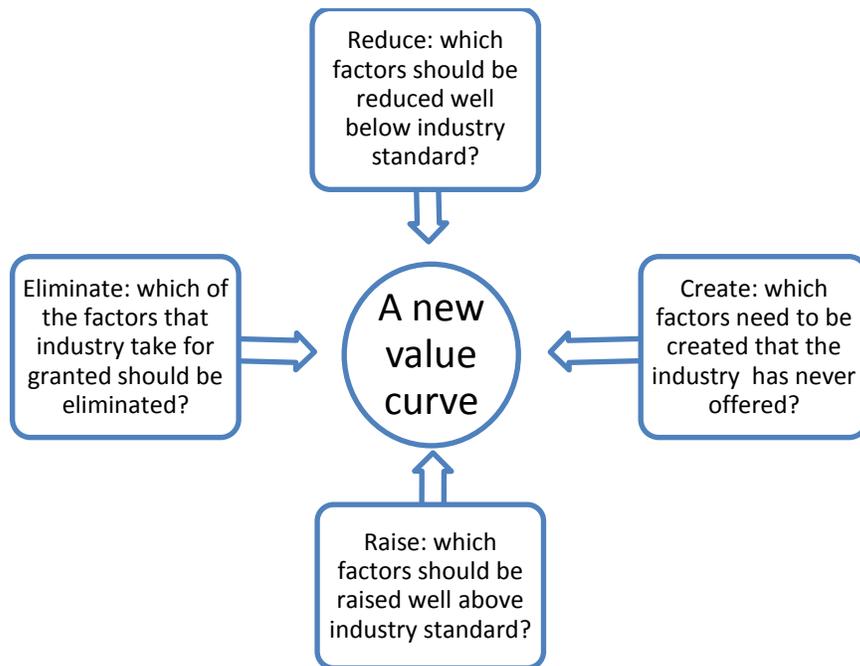


Figure 4: Four-action framework (Mauborgne & Kim, 2009)

The four-action framework helps in recreating market boundaries. In order to aid this process, the authors provide the *six path framework*. Each path of this framework is briefly explained below.

- Look across Alternative Industries: Identify different applications for the products and services offered by the firm
- Look across Strategic Groups within Industries: Identify two different strategic groups like price and performance and combine them to create a new offering.
- Look across the Chain of Buyers: To target different buyer group, in the chain of buyers in an industry
- Look across Complementary Product and Service Offerings: to identify the activities that happen before and after the usage of product and combine them along with the existing product offering
- Look across Functional or Emotional Appeal to Buyers: To identify competing parameters like emotional value, instead of traditional price and function
- Look across Time: Project the emerging technologies and identify ways to adopt them for new products and services

With the six-path framework approach, it is possible to alter conventional boundaries of competition to create blue oceans and this would help in avoiding head to head competition (ibid).

2.2 Resources & Capabilities

A firm's ability to maintain its competitive ability is based on its resources and capabilities (M. Grant, 2001). Once its competitors imitate, the focus firm losses its competitive advantage (ibid). In order to sustain the advantage, there is a need to identify the focal firm's resources and capabilities. Defined in Amit (1993), resources are

the inputs for any process. Resource of a particular firm can be financial, physical, human, technological, reputation and organizational resources. Resources are converted into final products or services (ibid). Capability refers to firm's ability to deploy the resources to perform a task. The performed task is the one that results in the competitive advantage (M. Grant, 2001).

Understanding firm resources can be achieved by studying the focal firm based on the above resource classification. Capabilities can be understood by studying the organizational routines. Routines are defined as the sequence of coordinated actions individual performs in a predictable manner to complete a task (M. Grant, 2001).

According to Amit (1993), the focal firm's resources and capabilities contribute to the formation of strategic asset (SA) for the firm. Typical SA for a firm is technological capability, fast product development cycles, brand management etc.

One particular capability that gains popularity in an open economy and rapid innovation with open innovation setup is Dynamic Capabilities (Teece, 2004). Dynamic capability is a set of specific and identifiable process like product development, strategic decision-making and alliances (Eisenhardt & Martin, 2000). This enables firms to sense the opportunities & threats seize the opportunities to maintain competitive edge. Dynamic capability is achieved by reconfiguring the strategic assets to suit the needs of the opportunity. To sense these opportunities, firms should search and explore technologies & markets both locally and outside. The framework used for sensing the opportunities should recognize innovation and its supporting infrastructure. Such a framework is possible only if it considers complementor, suppliers, the regulatory, standard setting bodies, judiciary, education and research institution. Combining the internal and external invention refines this reconfiguration further, which is also protected by Intellectual Property Right. This reconfiguration of assets results in forming a new business model, which insulates the firm from competition (ibid). There exists wide range of articles that discuss dynamic capabilities and firm ability to handle them (Winter, 2003) (Zollo & Winter, 2002).

2.3 Business Model

The term Business Model, which came into existence during .com or Internet boom (Magretta, 2002) is defined as a system of interdependent activities, which enables firms along with its partners to create and appropriate value through their offering (Zott & Amit, 2010). As per Osterwalder (2004), business model is a tool that describes the interaction between different elements such as partners; firm, supplier etc. are represented in simplified business logic. The relationship between the elements explains how the company generates revenue. This also describes the value the company offers to its customers in network with its partners. But the same Business Model is defined as a framework, where technological characters along with other potential inputs are converted into economical outputs through customers and markets (Henry Chesbrough, 2002). Looking at these definitions we can conclude that business models emphasize on creating value to the customers.

The art of creating value differs for different business models (Zott & Amit, 2010). There are four different types of business model: creators, distributors, landlords and brokers (Peter Weill, 2005). A creator is one who manufactures a product, a distributor is one who buys and resells them, and landlords are the ones who sell the right to use, but not own the products and brokers are the agents who does match making between buyers and sellers (ibid). For all these kind of business models, the resources and capabilities required to create value are totally different from each other. These resources can either be from the firm or from partners, suppliers and customers (Zott & Amit, 2010). The choice between these models will decide the capital expenditures, price of the offering and the margins (ibid). A clear correlation between different business models and different economic returns was also established by case study done by Björkdahl (2009).

Success of business model depends on, if the interactions between the elements make some logical sense, the numbers add up (Magretta, 2002), and the nature of technology and financial investments (Björkdahl, 2009). Different technologies will require different business model in order to appropriate the value from them (ibid). When the offerings from competitors are same as the focus firm, head to head competition will be the result and drive down the profit margin of the all the actors in the competition. In order to differentiate, there is need to develop a new business model which will keep itself away from its competitors (Magretta, 2002).

A change in the business model to differentiate the offering is also known as Business model Innovation Johnson, et al (2008). Such changes in the business model have helped companies like Wal-Mart and Target to differentiate themselves (Magretta, 2002). In order to change the business model, we need to understand the activities performed by the firm (Zott & Amit, 2010). There are many approaches to delineate the existing business model. Below work explain various methods to map and existing Business model.

One way to map the existing BM is through activity system approach. An activity can be defines as use of human, physical or capital resource in order to attain an objective. Such activities can either be performed by firm itself or through its partners and suppliers, in order to appropriate the value. Firms' revenue model also plays an important role in appropriating the value (Zott & Amit, 2010). The activity system consists of two main parameters: design elements and design themes.

Design elements describe the systems architecture:

- Design element Content: refers to the activities that are performed by a firm, which results in some form of customer offering
- Design element Structure: explains how different activities of the firm relate to each other
- Design element Governance: refers to who perform those activities

Activity design element can be characterized by design themes, which helps in creating value.

Design themes describe the source of value creation:

- Novelty: A novelty based activity design defines new way of connecting different activities
- Lock in: Lock in based activity design ensures high switching cost or network externalities
- Complementarities: This kind of themes are exhibited when activities are bundled up to create more value than doing it separately
- Efficiency: This kind of theme is exhibited by the firm, which operates at a very efficiency through reduced transaction cost (Zott & Amit, 2010)

Another way to map the existing BM is to map the different elements and interactions defined by Osterwalder (2004). This BM explains the offering from a company, how the offering reaches the customers and how the company makes money etc. In detail, such a business model consists of nine building blocks. They are

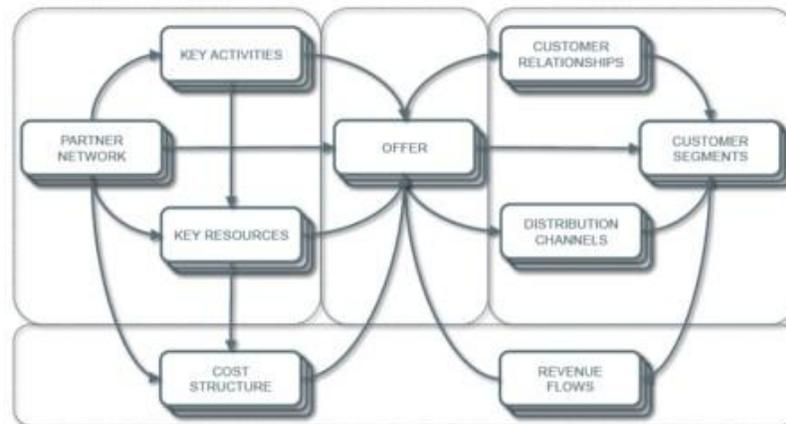


Figure 5: Business Model (Osterwalder, 2004)

- Customer segment: group of customers with distinct characteristic
- Value proposition: products and services that address the needs of the customer
- Distribution channel: channel through the firm interacts with the customers and also channels its value proposition
- Customer relationship: defined by the nature of service provided to the customer
- Revenue streams: means of generating revenue for the value proposition we offer to the customers
- Key resources: resources which help in developing the value proposition
- Key activities: important activities performed to implement the business model
- Partner network: suppliers and partners with whom we work to deliver the business model
- Cost structure: cost incurred in executing and maintaining this business model

Mapping the nine building blocks individually can identify existing business model of any firm. This identification of elements can be done by forming a team of people from different department within a firm. Business model identification has to be followed by,

its strength, weakness, opportunities and analysis. This analysis will help in formulating a new business model by identifying the areas for improvement (ibid). Such formulation of BM requires a thorough understanding of various players involved. To aid the identification an understanding of various players, value chain analysis is used. More information regarding value chain is provided in following section.

2.4 Sustainability

By definition, sustainable development is one that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). Hardin (1968) discussed the conflict between individuals’ self-interests and public shared resources. From the ecological point of view, Hardin claims that increasing population will ultimately exhaust shared limited resource, even though such result is not in anyone's long-term interest. In business context, this conflict has been the base for companies to focus only the self-interests since the financial gain would be obtained by the firm but the loss would be shared by the general public.

With pressure from ecological and social environment groups, firms are forced to include the sustainable development in their Corporate Social Responsibility (CSR). Many of the definition relates to the corporate citizenship concept (Carroll, 1999); (Matten, Andrew Crane, & Wendy Chapple, 2003)) Moving from pure financially focused, CSR nowadays is oftentimes also described as the corporate “triple bottom line”: the totality of the corporation’s financial, social, and environmental performance in conducting its business (Elkinjton, 1998) as shown in figure 6.



Figure 6: Triple Bottom Line (Elkinjton, 1998)

Unlike taking the CSR as burden and extra cost (e.g. corporate philanthropy), Porter and van der Linder (1995) argue that thinking green can make company competitive. Firms should view environmental concern as driver for successful innovation instead of obstacles. The authors make claims that: firstly environmental standards could trigger innovations that lower total cost of products or improve the value; secondly pollution is inefficiency, thus innovation that reduce pollution increase the resource productivity; lastly environmental regulations is needed and could provide the pressure to motive firms to innovate etc. Sustainable market framework focusing on reducing surplus supply and reduce reverse supply are examples of cost reduction (Sharma, Gopalkrishnan R. Iyer, Anuj Mehrotra, & R. Krishnan, 2010).

Roy (2000) introduces the concept of sustainable product-service systems, one step further than the environmental optimization of products and processes that suggested in the Porter and van der Linder (1995) article. Sustainable product-services consider alternative socio-technical systems that can provide the essential end-use function, and four types are outlined: result services; shared utilization services; product-life extension services; and demand side management. Ottman (1998) also provides a framework for thinking about solving environmentally related consumer issues creatively. The author (ibid) pointed out business should learn to think in circles and be self-sustained, just as the Mother Nature.

On another stream, Nidumolu and Prahalad (2009) discussed that sustainability is actually the key driver for innovation. As shown from empirical findings, proactive environmental strategy may lead to the development of unique competitively valuable organizational capabilities thus competitive advantage (Sanjay Sharma & Harrie Vredenburg, 1998).

Number of examples, especially from European countries where higher awareness of environmental concern exists in the general public (Roy, 2000), is taken to support the arguments. Companies from consumer product industry (ibid), flower industry (Porter & Linde, Green and Compitative, 1995), electronic industry (Sharma, Gopalkrishnan R. Iyer, Anuj Mehrotra, & R. Krishnan, 2010)etc, are all examples of successful sustainable business development and application. Therefore, it has been proven new business concept and opportunities could rise from the increasing environmental conscious of the customers.

2.5 Value Chain

Value chain is defined by Porter (1985) as, “Every firm is a collection of activities that are performed to design, product, market, deliver, and support its product. A firm’s value chain and the way it performs individual activities are a reflection of its history, its strategy, its approach to implementing its strategy, and the underlying economics of the activities themselves”. A graphic representation is presented in figure 7.

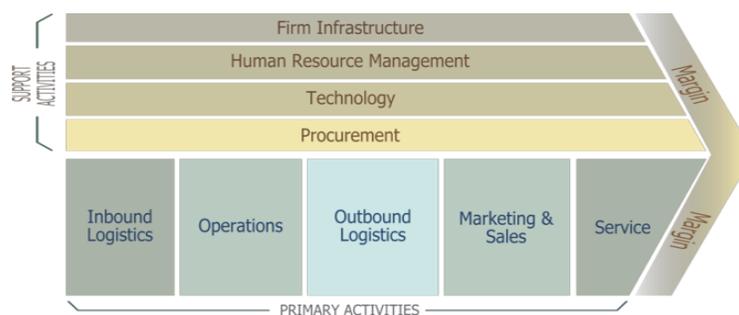


Figure 7: Porter Value Chain (Porter M. E., 1985)

Davies (2004) presents the typical value stream and Railway is one industry typical fits the stream. Value-chain analysis includes the whole cycle of the organization, production to delivery of products, from inception to use and recycling. This acts a tool for mapping these crucial domains of private and public policy (Kaplinsky, 2004). The analysis is important for the following reasons:

- Value chains are repositories for rent, and these rents are dynamic
- Effectively functioning value chains involve some degree of “governance”
- Effective value chains arise from systemic-, as opposed to point-efficiency

One main purpose of studying the value chain is to understand how suppliers of capital goods are occupying new positions to provide integrated solutions. Value chain mapping is to identify the entire set of value-adding activities within an ‘industry’ (Davies, 2004). One analysis based on value chain of certain industry is the analysis of profit pool, which is defined as the total profits earned in an industry at all points along the industry’s value chain (Gadiesh & James L. Gilbert, 1998). The shape of a profit pool reflects the competitive dynamics of a business and it opens a window onto the underlying structure of the industry. These articles provide a four steps guideline, define the pool; determine the size of the pool; determine the distribution of profits; reconcile the estimates.

In the literatures, authors have pointed out a misunderstanding, that greater profit follows greater revenue. Factors change the distribution of profits along the value chain could originate from deregulation, new technology, or new competitors (Gadiesh & Gilbert, 1998). Taking the perspective, or rather lens of profit pool, firms may go for different strategy, from growing to profit focus. Mapping out profit pool of a given industry is tricky. (ibid). The aspect of moving down the value chain in order to appropriate more value is described in the following section.

3 Methodology

This section explains the methodology used in the execution of this project in order to answer the research questions

To answer the following research questions, the methodology followed in this project is explained in this chapter.

RQ1: What are the current trends and opportunities in the transportation industry?

RQ2: What relevant resources and capabilities of BT will be required to appropriate the opportunity?

RQ3: What is the new possible Business Model setup that Bombardier could adopt to capture value from a market, whose characteristics are different from existing market?

3.1 Scope definition

At the early phase of the project, the scope of the thesis was very broadly defined by BT. In order to have a meaningful investigation; the scope was narrowed down with the help of first research question. As a part of market research, the transportation industry was analysed for identifying potential future growth opportunities. For this purpose, literature survey was conducted to understand the methodology that needs to be adopted to identify future growth opportunities. Based on the findings, it was decided to have qualitative research strategy to identify how the industry is changing.

Open interviews with BT's supervisors were conducted in order to obtain industry insiders knowledge and firm's resources and capabilities. Various market intelligence reports, Company reports and individual government transport strategies were studied to understand how the transportation industry was shaping as on Dec 2010. Based on these findings, four different possible business potential's were identified and business models to appropriate them.

Out of these four opportunities, one was selected based on criteria such as long term benefits, perceived market opportunities and its relation to existing resources and capabilities. The evaluation process was done together with company supervisors and it is qualitative in nature. This decision helped in identifying the deliverables for the project, which included a submission of viable business model innovation within the available timeframe.

3.2 Research strategy

The delivery of new business model will involve data collection, analysis and testing of existing theory on resources and capabilities and business model innovation. To complete these tasks the research strategy adopted is abductive in nature. This approach is qualitative in nature, where emphasizes is more on words and it is used to develop theory Bryman & Bell (2007).

A detailed literature survey was performed to understand the theory associated with the resources and capabilities, strategy creation, value chain analysis and business model Innovation. This survey helped the authors in understanding the tools and

provided valuable insights on the usability of them under the specific context of delivering rail mobility solution.

3.3 Research design

The research design adopted in this project is cross sectional design, where qualitative data was collected at a given point of time. The reliability of data collected through interviews was ensured by having two interviewers for every interview. The internal validity, which tests the match between the researcher’s ideas and the theoretical ideas they develop, was verified by verifying the claims against the internal documents available. The methodology adopted in answering the below research questions using the work process as explained in figure 8. To answer the research question market research was performed. This approach might have led to few methodical flaws in the way the research was structured. For example, market analysis, which is normally performed after the scope is defined, was performed here to define the scope of the project. But this actually helped the authors to gain an overall understanding of the transportation industry. Following market research BT’s resources and capabilities were mapped by interviewing BT’s employees and the combination of research question one and two answers helped in developing a new business model which answers research question three.

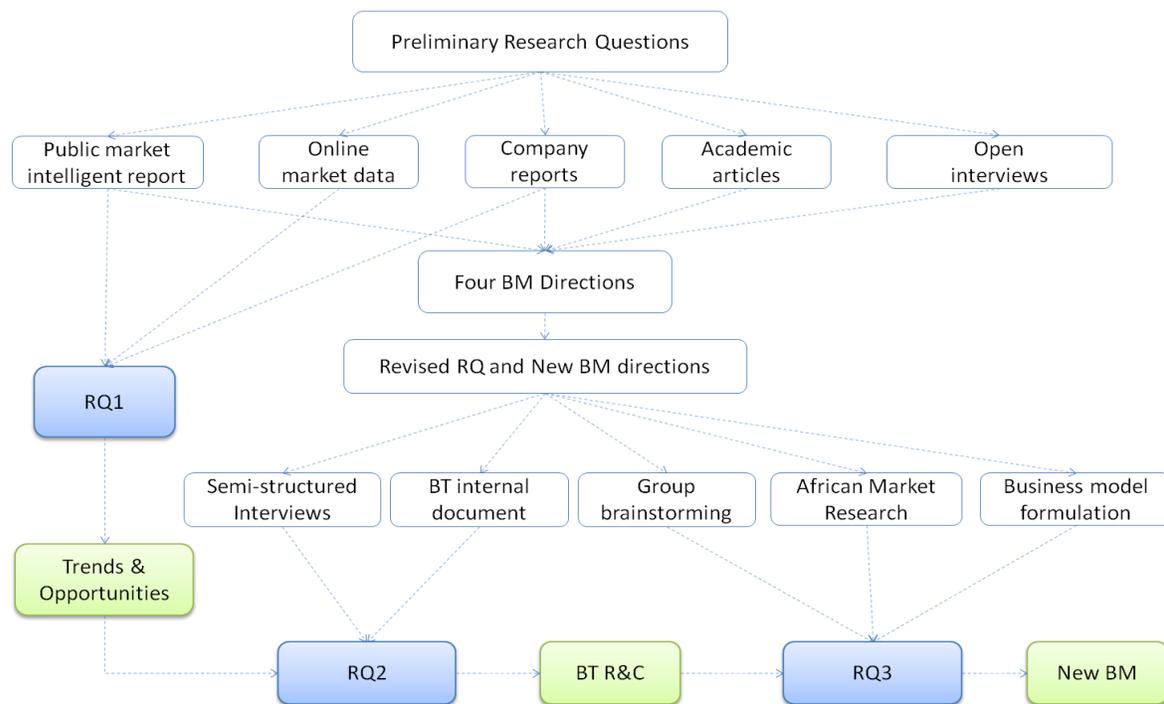


Figure 8: Research Design Graphic Representation

3.4 Data collection

A cross sectional research design was used to collect data meant for identifying BT’s resources and capabilities. In this method, data was collected on more than one case at a given point of time. Apart from identifying the resources and capabilities, data collection was also used for market research activities. Collection of data was classified into primary and secondary. Primary data are the data collected through interviews;

refer to Appendix I for the list of interviews conducted, and secondary data consists of data collected through web searches and internal documents.

Validity of the data is ensured by verifying the claims against the internal documentation of the company. Reliability of the data collected ensured by interviewing more than one person on same focus area of the interview. According to Bryman & Bell (2007), validation and reliability helps in assessing the quality of the quantitative research. In a quantitative research, reliability measures the consistency of the measures and validity indicates if the concept really measures the concept. In case of a qualitative research, which gives more emphasis on words rather than numbers, the validation and reliability are measured using trustworthiness, authenticity, and triangulation. These three concepts represents are similar to the validation concept used in quantitative research. Dependability and conformability acts as parallel concept for reliability. The qualitative research, which depends on interviews, results in collection of thick description of events.

3.4.1 Resources and capabilities

In order to map the resources and capabilities of BT, semi-structured interviews were conducted across the company. These semi-structured interviews were conducted as a part of qualitative research. A detailed interview plan was developed in consultation with interviewees and company supervisor. This ensured their availability for the interview. Once the interviewees were identified, separate interview questions were prepared for each of them. The interview questions were pre-tested and fine-tuned for the final interviews. 17 interviews were conducted to identify resources such as financial, physical, human, technological, reputation and capabilities such as sales, marketing and project management. More than one person were interviewed for each of the topic, this ensured the trustworthiness of the data. This data acted as primary data. Each interview lasted 30 min to 2 hours. On top of the 17 interviews, more follow up phone conversation were conducted for clarification in case needed. Secondary data were collected in the form of internal reports such as organizational charts, sales documents, process documents and various other presentations from different divisions. Interview findings were triangulated with the Bombardier internal reports obtained from the interviewees and other teams. This triangulation ensured the validity of the data and thus the quality of results. A qualitative content analysis on the results helped in understanding the company's resources and capabilities. Identification of resources and capabilities helped in answering the research question two.

3.4.2 Market research

Market research was primarily performed through secondary data collection method. It was used to identify potential market opportunities. For this purpose documents such as transportation strategy reports from various governments; consultancy reports such as McKinsey, PWC; reports from World Bank, UN on various countries and market intelligence report were used. Downloading them from directly reputed websites such as UN, McKinsey, etc. ensured the authenticity of data. The validity of the data was gained by triangulating the findings from different reports. In order to study the viability of the BM, a target country was identified and studied. For this purpose market research was performed to gain understanding of African market economy at a macro

and micro level, transport networks and about non-governmental investors through secondary data collection method. This was done by studying reports from African governments, African union and UN and World Bank. This helped in identifying potential opportunity to rollout rail mobility solution. Identification of market opportunities helped in answering research question one.

3.5 Data analysis

The data generated through the semi-structured interviews were analyzed using qualitative content analysis method. Applying this method, the data is analyzed to identify a theme or a pattern. This helped in identifying the core consistencies and meanings of the interview results, which in turn resulted in mapping the resources and capabilities of BT and identification of market opportunities.

3.5.1 Analysis of existing business model

The existing business model was mapped after understanding the existing resources and capabilities of BT. This model was analyzed to identify the shortcomings in existing resources and capabilities, which could potentially prevent BT from delivering rail mobility solution. This identification of missing capabilities was done by comparing existing business model against the process involved in developing and operating a rail infrastructure in African markets. For this purpose existing project in the focus country and other similar across Africa were studied. This led to the identification of critical resources such as ability to arranging for finance from different sources and operational capabilities.

3.5.2 Business model

The development of new business model innovation involves mapping of different element of the business model innovation framework. This enabled in the identification of cost and revenue structure of the project. Revenue structure identification also involved identification of different sources of revenue generators. For this purpose, a brainstorming session was conducted involving people from different divisions such as SYS, Sales, Strategy and SER. A combination of brain-writing and brainstorming session was used for this purpose. The lists of ideas generated were used in identification of different sources of revenue or methods to capture value from the market. This helped in answering research question three of this project.

4 Empirical Results

This section presents the primary and secondary data empirical finding.

The empirical section presents the data collected from internal documentation and interviewing employees of BT under the section titled Bombardier Transportation R&C. The data collected through web searches are presented under the title Market research.

4.1 Bombardier Transportation R&C

Bombardier transportation is capable of delivering all the products and services required for the railway industry. This is possible due to fact that BT possesses all required resources like human, physical, IP, etc and capabilities like organizational skills for successful execution of various projects across the world.

4.1.1 Organization Structure

BT works as a matrix organization (Strubbe, 2011). It has 6 business divisions and 9 supporting functions, which is represented in figure 9. In every division, there are mapping 9 functions. And for every function, a group team aligns all the divisional practice.

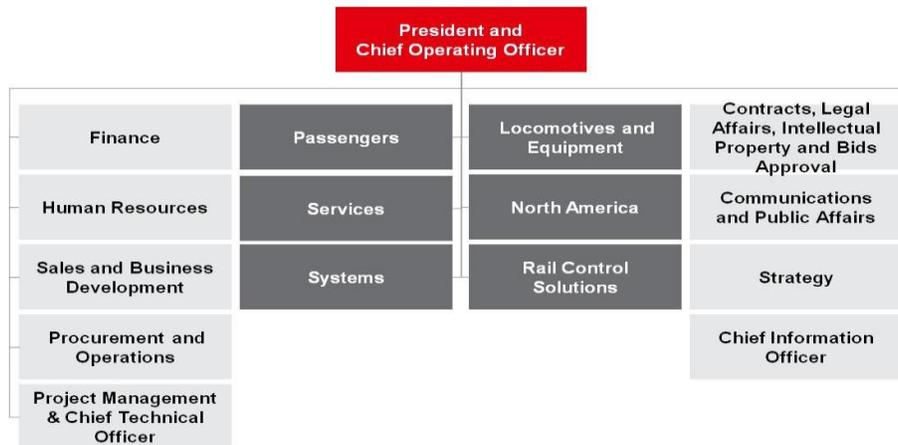


Figure 9: Bombardier Transportation Organizational Chart (BT Internal document)

In this project for the proposed new business model, relevant divisions are SYS, RCS and SER, and relevant functions are PM/CTO, strategy, HR, sales, and finance. Details of the divisions and functions, which could potentially affect the outcome of this project, were identified and are explained in the following section.

4.1.2 Divisions

In BT, every division works independently from each other in terms of Profit and Lost (P&L) (Ertl, 2011). BT divisions are internal supplier and customer of each other. For example, Locomotives and Equipment supply Passenger division with bogies and engines. Rail Control Solution supply Passenger with signalling equipment. Passengers supply System division with completed trains. Each division is free to buy their product from external supplier; and sell to external customers. In this project, the relevant divisions are System and Service. System division is headquartered in Berlin. And the division deals with complete system solutions (ibid). The business model of System is

described in the Chapter 5.2; therefore, the information will not be presented again here.

Service division (SER) is headquartered in Berlin (Atzerodt, 2011). This Division provides a full suite of products to help customers optimize their asset value over the lifetime of the vehicles. SER offerings include fleet management; crash and accident repair, spare parts and logistics solutions; vehicle refurbishment and modernization; and component repair and overhaul. Fleet Management deals with contracts based on fleet availability during operations, punctuality and reliability. Fleet Maintenance with contract based on availability at the depot in the morning. Parts business and logistics solutions include Ad hoc parts sales; frame agreement; Material Supply Agreements with Consignment Stock, availability guarantee, lower inventory levels; Warranty Extension for Corrective parts; material kits for overhaul, crash, damage & vandalism and refurbishment.

Vehicle refurbishment handles the complete modernization work on, Electrical/Diesel Propulsion, interiors, energy saver and various other retrofit operations including mechanical scope, crash and accident repair. Currently, models that undergo refurbishment are coaches, diesels locos, and diesel-multiple train units. Electrical locomotives are too sophisticated for refurbishment and one main cost driver in refurbishment is the RCS system, which also obsolete fastest. Competitive time-line in refurbishment is approximately 50% of the time required for new built, i.e. 9 months for a coach, 12 - 15 months for multiple unit or loco. SER also provides refurbishment services to trains from other manufacturers. Service team possess the ability to refurbish different models in different locations. The complexity of the refurbishment process becomes higher, if it involves electronics components.

There exists interaction between SER with other divisions like PGR, RCS, PPC, and LAE. SYS currently uses its own facilities for building new trains and maintenance activities, thus no interaction has been established between SYS and SER. SER has 11 service locations (internal and external) for crashes and bigger Vehicle Refurbishment and Maintenance projects; main refurbishment site is in Hungary (Dunakeszi). Due to the volatility of VRM business it is difficult to fill a factor. Therefore SER's current strategy is not to build up own factory for refurbishment, but to go with partners, tailored for each and every upcoming project. This enables the best flexibility and reduces risk of under absorption (ibid).

Regulation associated with refurbished train varies between countries. It also varies based on components being refurbished. If such a refurbished train is sold in international market, homologation requirement for the respective country has to be identified. Due to new international standards such as crash, emission, axle diameters etc. it need to be clarified if old trains can be driven in the particular country. If yes, the time-line for homologation need to be taken in consideration and is very often underestimated.

4.1.3 Functions

Across all the nine functions, group level teams are supporting divisional teams, by providing tools, guidelines, governance, and coordination to make the practices in six

divisions more efficient and aligned. These are extremely important and complex task due to the massive acquisition history of the current company. As a result, there is no centralized functional team. Certain consolidation work, e.g. finance, BT level recruitment and strategic planning are carried out only at group level. Only five out of nine functions are described below, since the contribution of these functions can affect the outcome of this project.

4.1.3.1 Strategy

Group strategy team helps individual division strategy team by providing them with market research data for their strategy formulations (Luger, 2011) (Parizot, 2011). Individual divisions identify the upcoming opportunities in different parts of the world and develop their own strategy plan. This opportunity identification is done by the sales team, which maintains close contacts with clients. All the strategy plans, or rather potential sales information from different divisions are combined together to form the BT strategy plan with 3 years' time horizon. The current plan with three years' time horizon aims at achieving 8% earnings before interest, taxes, depreciation, and amortization (EBITDA). This also helps in identifying the investment required for upcoming projects. In order to ensure the proper execution of the strategy plan, relevant employees are identified to handle the initiatives.

BT group strategy is also responsible for developing the strategy with a time horizon of 5 and 10 years. Taking competitive intelligent reports, market requirement and technology into consideration, the strategy forecast plan is developed with 5 and 10 years time horizon. And this practice is place only for the past 2 years in BT.

4.1.3.2 Sales

Every division within BT has its own sales team (Albexon, 2011). In order to avoid the confusion of multiple sales teams approaching customer for a single project, BT in various countries is represented by chief country representative (CCR) and reports directly to Group Sales. CCR maintains close relationship with the customer, identifies upcoming opportunities and are also responsible in shaping the opportunities to Bombardier's benefit. Identified opportunities are categorized according to the likelihood of getting converted to realized sales. Opportunities classified under A have high chances of getting converted into order, opportunities under B are backups that having less chance to win but are twice as big as A in terms of quantity.

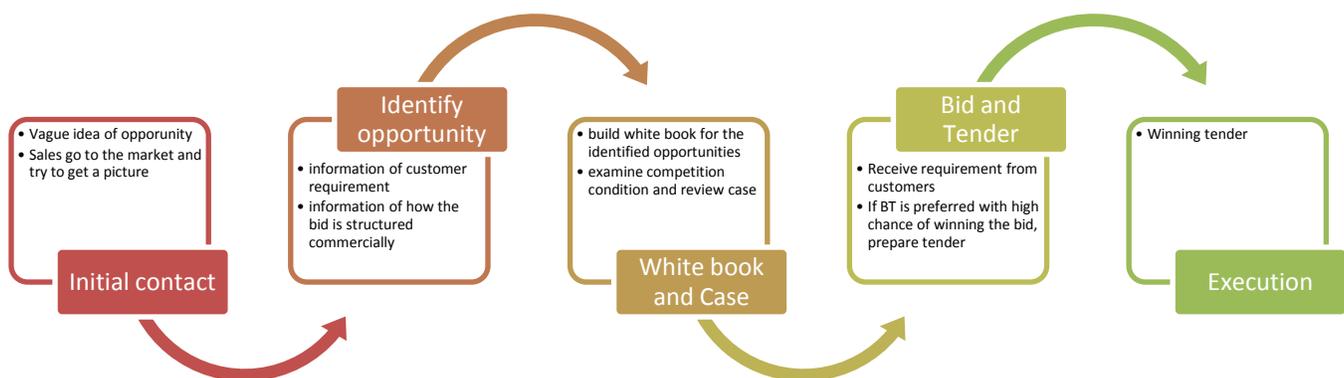


Figure 10: BT sales process

Sales team approaches the customer upon knowing upcoming opportunities, even if it is of vague idea. Once the initial contact is made, the typical sales process follows as above described in Figure 10, to address the available opportunities. Upon contacting the customer when there is a vague idea of the opportunity helps sales team to gain information on possible customer requirement and bid structure in the opportunity identification phase. Opportunities identified are further developed by building a case on it, which is known as white book. This also covers the examination of existing competition in white book and case phase. In the bid and tender phase, the actual requirement from customer is received and bidding is done. Upon successfully winning the bid by BT, execution of the project follows. Currently, there is trend or initiative from BT of moving from this process to strategic sales, where value for customer on a long term is more emphasized. For new products and services, sales teams are trained regularly from Bombardier for effective selling. At the moment, most of the sales in BT are initiated from customer needs and catered on project bases.

4.1.3.3 Project Management and CTO

Engineering, Innovation Management and Project Management are integrated parts of Project Management and CTO division that are under focus of this project. Engineering within BT is divided into group engineering and division R&D (Siefkes, 2011). Group engineering is responsible for establishing the improving the R&D process. Division R&D is responsible for product development and testing on project basis according to customer requirement. BT engineering team follows a nine-step process for product development. This involves all steps of identification and test of basic technology, followed by testing in lab, test in systematic environment, on train test and finally testing on the tracks. Such activities last between 6 months to 4 years. Division R&D also works closely with its sales team to understand the upcoming market needs, norms and match them with technical solutions.

In order to facilitate innovation at division level, an innovation management portal known as Innovation express is used. This portal is used for collecting and evaluating ideas in a systemic manner. Every division has an Innovation manager, who acts as a champion in spreading the innovation message and responsible for the innovation metrics within the division. There exists two different ways to collect Ideas. One is through the idea campaigns; another is through the predefined innovation focus areas. Campaigns are more focused on need-based innovation and predefined focus areas helps in random ideas generated by the employees in the particular focus areas.

4.1.3.4 Finance

Group finance consists of group controlling, shared services (accounting & reporting), planning & governance, structured finance and business controlling (Herbig, 2011). Group controlling is to help different divisional finance controlling team to perform efficiently. The structured finance team provides internal consultancy on different activities like sales bid, leasing, contract, hedging etc. Planning and governance team is responsible for improvement initiatives. The accounting and reporting are centralized based on geographies. The regional teams report to divisions. Consolidation of all financial data is done at group level. All the investment requirements are identified by

the division finance, while developing the strategy plan. These investments are approved based on the revenue generation potential.

4.1.3.5 Human Resources

Human resource function in BT is divided into Business Partner (BP), Shared Service Centre (SSC), and Centre of Expertise (CoE) (Strubbe, 2011). SSC is responsible for compensation & benefits, data management, recruitment, and learning & development. For the recruitment process, SSC and BP work together. BP who works closely with business functions prepares the requirement for opening positions, and SSC recruits candidates to fill in the positions. CoE sets HR policy and guidelines, deals with long term strategy, makes new systems decisions, HR management at BT level such as performance management, career site and designs HR process. As BT works as a project based company, hiring process normally start from the BTP (notice to proceed, referring to the sales process Figure 9) point of the project. Workforce planning is part of the project planning. HR allocation for projects in new countries is handled in various ways depending on the expectation of ending of project. Before BT goes into a new country, HR would check the labour market research, using social media like LinkedIn, for key positions on individual basis. Talent management process takes place on yearly basis. For all top 100 positions, one or two internal successors are identified.

4.2 Market research

Market research was performed in order to understand the influencing factors, which affect the transportation industry and identify the industry trends. The methodology adopted for performing this research is explained in section 3.5 of this report. The findings of the research are presented below as influencing factors and industry trends

4.2.1 Influencing factors

Transportation industries are affected by both macro and micro economic factors of any given country. This is due to the fact that the policies governing the transport infrastructure are affected by these factors. Factors such as population, economic growth, globalization, energy issues, climate concerns, technology developments and accidents were identified as important factors that shape the transport policies across the world. Details about the effect of population and economic growth on transport policies are explained under section 1.3 of this report titled as current scenario. Climate concerns and energy issues are prompting the governments across the world to enact legislation, which forces the industry to reduce carbon footprint. For example the carbon reduction commitment energy efficiency scheme in UK makes 10% reduction of emission for public and private firm as a mandatory clause (Department of energy and climate change, 2011). Accident is another important factor that affects the transportation. Policies meant to reducing the accidents helped EU to reduce the accidents by 16% (2002 Vs 2007) (Health and safety executive, 2007). On the other hand accidents have reached epidemic level in Asia pacific region. Up to 60% of 1.16 million deaths happening due to accidents across the world is taking place Asia Pacific (The China Post, 2010). All these factors coupled with technological advancement and globalisation shape the transportation industry.

4.2.2 Industry Trends

Industry trends describe the way players in the transportation industry respond to the influencing factors and government policies towards that. These trends are aimed at solving the problem, which influences the transportation industry. Factor such as very high accident rates as explained in previous section can be solved by having efficient traffic management system (bmvbs, 2011). The rapid urbanization can be tackled with improved public transport systems (Frank Weiler, 2005). Upon analysing the industry to identify such trends, few major trends were identified and are listed below.

4.2.2.1 Intelligent Transportation System

Intelligent transportation system (ITS) normally include, traffic prediction, planning and management; integrated and smart fare management for passenger and freight; enhanced traveller experience and advisory for travelling (Forstreiter, 2010), (Khaliq, 2010). (Forstreiter, 2010), quoting WBCSD, forecasts that passenger traffic worldwide will post an annual growth rate of 1.6% up to 2030, while freight traffic is expected to increase by 2.5%. To make sure such systems operate efficiently and safely in everyday life, intelligent control and maintenance network would be required.

Worldwide market for such ITS is valued at \$24 billion in 2010, and is expected to increase at a 22.2% compound annual growth rate (CAGR) during the forecast period to reach a value of \$65 billion in 2015, with the main growth area being emerging markets in Asia-Pacific and Caribbean-Latin America. In China the central government is planning to implement ITS in 50 cities (Qiu, 2005) and the market forecast is valued at €50 billion. Many ITS projects are closely related to public mass transportation. In developing countries, better connected transport could reduce logistic price and increase efficiency; in big urban cities, ITS normally deal with urban mobility.

4.2.2.2 Integrated (or) Intermodal transport system

A transport system, which enables seamless transfer of people and goods by providing convenient connection and transfer facilities among all modes of transport, is known as Integrated or Intermodal transport system Federal Transportation Advisory Group (2001). This is achieved by integrating different modes of transports such as buses, trains with airports and ships. This reduces the travel time, congestion, pollution and improves the safety of overall transport infrastructure (ibid). This kind of interconnection of different transport modes is possible with the help of ITS. Countries across the world are implementing integrated transport network to tackle the effects of urbanisation, pollution and energy crisis.

4.2.2.3 Efficient Transport system

In wake of the energy crisis, climate concerns and government regulations on emission control, the transportation industry responding with sustainable transportation strategies. With a sustainable transport infrastructure, the industry could reduce the green house gases with the help of technological developments. This has led to transport systems, which are highly fuel efficient, runs on eco friendly fuels (European commission, 2009). Software such as Minefleet from IBM (Kargupta, Puttagunta, Klein, & Sarkar, 2006)is used to improve the fuel efficiency by improving the vehicle performance.

4.2.2.4 Cost concern and low cost requirement

With the advent of economic crisis, cost control is used as tool to maintain the health of transport infrastructure. For example in UK plans are afoot to save close to £1 Billion by integrating freight and passenger services (Brett, 2010). Similar practices can be seen across the world. Cost control can be achieved by also improving the performance parameters. Currently there are software's available in the market which monitors the vehicle performance. Software's such as Minefleet as described above are also used to monitoring of vehicle health, emissions, driver behaviour, fuel-consumption, and fleet characteristics. This onboard data stream mining software helps in modelling and benchmarking of performance. This service is also related to the auditing system, with focus of vehicle performance.

Transportation systems are complex and expensive, to build and operate. Investments involved in transportation projects are listed as major government expense in many countries. For example, the cost of an 80 km long railway network constructed in South Africa is close to €2.5 Billion (fin24, 2011). Due to the heavy cost involved, financing transportation projects are shifting from solely government fund to public private fund. But major African countries are facing trouble in infrastructural investment due to lack of money. This put emphasis on developing low cost transportation strategy targeted at alleviating the problems faced by the poor people (Mitiku, 2009). Global organizations such as World Bank, European development fund, Emerging Africa infrastructure funds, African development fund and the Chinese government are investing billions of dollars in infrastructural projects across Africa with a goal of the restructuring its transportation industry to ensure financial viability, which is independent from government financial support (Emerging Africa Fund, 2007) (World Bank, 2011) (Dollar, 2008).

4.2.2.5 Passenger Safety

Death of people due to accident in transport sector puts more emphasis on improving the safety statistics in this sector. In order to improve the safety of the transportation system users, industry is responding ITS will help in improving the safety. Technologies such as speed adaptation, collision avoidance, lane keeping, etc help in achieving improved safety targets (European transport safety council, 1999).

4.2.2.6 Personalized transport system

In order to improve the personal mobility, convenience and alleviate climate concerns, personalized transport systems are developed in many countries. For example in Abu Dhabi, an attempt is being made to develop carbon neutral city by having personalized transport solution named podcar to satisfy its transportation requirement (Carlisle, 2010). Similar kind personalized transportation system is in operation in Heathrow terminal London, which is used to transfer people from terminal to car parking (Ultra, 2010)

5 Data Analysis

This section presents the analysis drawn from the empirical data.

Empirical data, which collected through interviews, internal documents and web searches, were analysed in forming the new business model. The findings of the analysis are presented below as two different sections. Section 5.1 Business Opportunities in Transportation Industry summarizes potential opportunities that arise out of the industry trend analysis. Section 5.2 BT Current Business Model explains the current practices used by BT SYS for selling their products and services.

5.1 Business Opportunities in Transportation Industry

Upon analysing industry trends, potential opportunities for BT were identified. Below description explains how BT existing and additional resources and capabilities can be utilized to appropriate the opportunities available.

5.1.1 Intelligent Transportation System (ITS) Provider

Intelligent Transportation System, which valued at \$24 billion as mentioned in section 4.4.2.1, is not only relevant to BT for future business development, but also relevant for its current products and services. BT has leading signalling system for train operations and the technology might be transferred to wider application areas for other modes of transportation. Urban transportation planning could benefit from BT's knowledge of systematic operation. As trains normally have long life cycle, upgrade in term of software creates business opportunities in addition to BT's current life extension and modernization services. There are niche companies (e.g. icomera) that are providing on-board wireless communication systems that could bundle with the new product offering.

Fare system integration is one building part of ITS (Siemens, 2010). An integrated transportation system must have convenient payment system for users. A successful multi-modal system can be only realized with fully integrated physical and fare system for all its users. For passengers, there should be an electronic fare available when making transfers. For private car drivers, they could be able to pay the tolls electronically in all the road, bridge, highway, and city centre tolls, and parking. The technology is not only available, but already in application in cities like Singapore (LTA, 2009) and Hong Kong. As practiced by airlines, railway and bus operators, discriminated pricing might also be applied for inter-modal transportation for adjusting demand and supply. The integrated fare system presents itself as a vast business opportunity because the maturity of technology supporting this and the many successful implementations of such system prove the value of it.

This area is identified as relevant to Bombardier, as most of BT's products are involved in public transportation, and BT has ticketing machine as part of the Rail Control Solution. As an integrated part of the public transportation, BT can further develop the system into more comprehensive and customized solutions. BT is having an advantage with insight knowledge, and thus takes a share of this business opportunity. To capture this opportunity, human and technological are resources that BT needs to extend (Amit, 1993), possible direction includes experts in software.

5.1.2 Financial Services provider

Given the nature of very high investment involved in developing infrastructure as discussed in section 4.2.2.2 of this report, the ability to identify financial sources for customers would be a viable service in the transportation industry.

With complicated financial sources and aids available, it is not obvious the optimal way a transportation project could be funded. Different projects could attract funds from very different stakeholders. Some possible source of funding are studied and presented in the later part of the report, c.f. section 6.2.3. Thus financial services could become a very important service that BT's clients need, especially in the early phase of projects. Currently client arranges for required finances. Going upstream as described by Davies (2004) can serve as potential source of revenue. More secured funds could lead to better and more services purchased from product and service provider like BT. With close relationship developed from client around the world, a thorough knowledge base could be build and this service would take off with more customers served.

5.1.3 Audit Service Provider

Trends such as cost reduction (Brett, 2010), transportation safety (European transport safety council, 1999), efficient transport system (Carlisle, 2010), opens up a huge opportunity in the field of Audit services for BT. Audit services which enable the ability to improve efficiency, reduce cost, monitor and screening for upgrade choices, operational governance would be of interest for Investors, governments, and operation companies.

Bombardier has the opportunity to lead the development of new methods to holistically assess the costs and benefits of transport interventions, and act as advocates for sustainable transport through campaigning, research and public communication. With long lifetime of BT's product, maintenance and after sale services are involved for efficient working and prolong service life. BT with its wide range of products and services offered, the vehicle performance maintenance would be a low hanging fruit for harvest with some research and development on the software aspects.

5.1.4 Management and Operation Consultancy provider

Trends, which gave rise to opportunities such as audit services, also create new avenues for growth in the field of management training. The skill set and knowledge base of Administrative Capability is valuable to the current customers of Bombardier according to company interviews (Albexon, 2011). With more advanced physical system and equipment, the knowledge must be upgraded. To capture this opportunity, Bombardier need to develop and package a training service as independent offering, and deliver the extra value of better management and maintenance of the system by and from the user of system itself. The training would be a continuous business and it should not be confined to BT product.

Another area of service could be offered is about end-of-life service to trains. With vast amount of raw material involved in the manufacturing process, the end-of-life vehicles incur environmental and economical concerns to the customers. With upgrade of new vehicles and systems, it is to BT's customer interests to handle the outdated vehicles

(Mueller-Atzerodt, 2011). Together with the high environmental concern of the transportation industry, it is a great opportunity to push forward the end-of-life service for vehicles and vessels for BT in their service and product offering. The contract could be bounded or separate for new purchasing contract.

5.1.5 Rail mobility solution provider for Emerging Countries

As mentioned in the cost issue in 4.2.2.3, emerging countries have huge potential needs for railway infrastructure however the financial constraints are critical. One of the main problems associated with emerging countries rail infrastructure development is the ability to fund the project for its development activities and efficient operation of such system (Mitiku, 2009). These emerging countries represent the future market of BT in the long term and it is to BT's interest to tackle such problems with innovative business model (Ertl, 2011).

The problem can be possibly solved if BT can fund and execute the project and operate it for 20-30 years in order to make profit through the operation. But it will involve major risk with high upfront investment. Currently BT lacks the capability to fund such projects. The ability of a firm to reconfigure its strategic assets to develop new capabilities through partnerships is known as dynamic capabilities. This kind of reconfiguration will result in Business model Innovation (Eisenhardt & Martin, 2000). BT could possibly partner with other players in the industry to reduce the risk for such projects and approach the market with a new business model. This will insulate BT from its existing competitors in the industry by reshaping the competitive environment boundaries as described by (Mauborgne & Kim, 2009). More in depth study of this business opportunity is presented in later part of this report.

5.2 BT Current Business Model

In this section the existing business model of BT's SYS is mapped. This BM mapping is based on Alexander Osterwalder (2004)'s BM structure (refer to appendix II) as presented in the literature section. The purpose of the mapping is to understand the current business scope and practice of SYS, and the interaction of various players involved in delivering the value proposition. And moreover this BM of SYS is closely related to the proposed rail mobility solution BM. The entire section is drawn from various interviews with SYS strategy lead Silan Hun (2011) and BT internal documents, and this write up (chapter 5.2) has been reviewed and verified by her and her team.

5.2.1 Client segmentation

Projects within BT's SYS differ from one another in term of offering. Such offerings are highly customized based on the requirement of client. So there exists no intentional segmentation of SYS clients. Projects can be broadly classified into two types as urban applications and airports. This classification is based on the nature of usage. Current clients can be categorized to airport; city government; and rail operators. Due to the high customization products, there exists no standardized offering based on segmentation.

5.2.2 Value proposition

BT's SYS offers complete rail system solutions. A complete system project could include all components from infrastructure (including rail and civil infrastructure) required to operate the railways, rolling stocks, operation and maintenance of the entire system. The scope of the exact offering varies upon customer requirement and consortium formed. At times the scope of the projects is limited to development of infrastructure and/or delivering the required rolling stocks for operations. The operation and maintenance work might be taken by the customer or handled by other players.

5.2.3 Key activities

The key activities of SYS are marketing and systems design, project management, system engineering & integration, financing, testing, operation and maintenance (O&M) and system extensions.

Marketing and systems design: SYS has sales force for marketing product and service offering from BT and bidding for projects. The sales team work together with client and consultants in shaping up the project opportunity. System design activity consists of identifying the various component of the solution, for example nature of rolling stock, i.e. driverless or with driver, infrastructure associated, wayside equipment like fare collection, signalling equipment's etc.

Project management: project management involves coordinating with different stakeholders for effective project execution and also serves as single point of contact with customer. Other stakeholders involved for the project execution are described in the key partner component of the BM.

Systems engineering and integration: All complete system projects undergo the decomposition and integration phase. In decomposition phase, the operational need of customer is transformed into description of system configuration. In the integration phase, the technical parameters are integrated to ensure compatibility of the system.

Financing: BT's structured finance team supports finance related activities for SYS project. The major activity related with this are closing of deal, identifying the finance sources, risk involved etc. There are two different type of financing option available, public private partnership (PPP) and privately funded investment (PFI). In the PPP mode, the customer normally takes the major share of investment. Whereas in PFI, customer pays for the services offered. The investment required for the project is shared among various players in the project.

Testing and commissioning: This involves subsystem qualification, which measures the performance of the subsystem. This qualification is followed by subsystem installation and integration. Tests are performed to check the integrity of the whole system. Commissioning deals with launch of services.

Operation and maintenance: This deals with operating and maintaining entire rail system. SYS carry out these activities for some delivered systems when contract is awarded. Operation activity involves planning of staff, schedules, managing traffic data

and other operational issues. Maintenance activity, which involves the fleet maintenance, ensures the availability and reliability of vehicle and whole system.

5.2.4 Key resources

Key resources involved in the execution of above key activities can be classified into tangible resources and intangible resources. The tangible resources consist of human capital and physical resources. The resources required for the activities are contributed from both BT and its partners.

BT's human resources such as bid team, sales, legal, engineering, procurement, finance, and project management are involved at the initial phase of the project like consulting and systems design. Engineering resources are used during the systems engineering and integration activity. Partner's human resources play a major role in infrastructure development activity, finance, operation and maintenance.

The physical resources used for the key activities are the manufacture and service facilities. These physical resources used for these activities comes SYS's own manufacture as well as from PGR, RCS and SER. Apart from this, physical resources are also used in testing and other development activities like design and integration. Partner's physical resources are extensively used in the developing the rail infrastructure and power distribution systems.

The intangible resources include intellectual resources, brand image and financial resources. The intellectual resources include patents, copyrights, and highly skilled human resources. The brand image of Bombardier Transportation is used to market the products and offerings high in reliability and quality.

5.2.5 Partner networks

Partner network for Systems Division consists of various internal divisions of BT; PGR, RCS and SER. The other major partners involved in delivering the offering are the ones who provide electrification and infrastructure solutions. The SYS engages with these partners by either through contract or through direct partnership.

One key partner involved in complete system project is the civil construction company. They develop the infrastructure such station, depots rails, track work, elevated guide ways, develop required electrical systems etc.

5.2.6 Cost structure

The cost structure can be classified as staff costing, physical deliverable cost, testing cost, Operational & Maintenance cost and other miscellaneous cost like spare parts and service tools. Staffing cost can be classified at different stage of the project: development, design, build, release and operation phase. During the development phase, the costs incurred are due to activities such as bidding, system design, which requires heavy staffing from sales, legal and other consultants' support. During the design phase, the cost incurred is due to activity such as product design, which requires staffing from engineering teams of various division partners. In the build phase, the cost is due to staffing requirement from manufacturing, testing and management. And in the

operate phase, the cost incurred is due to staffing requirement from operation, maintenance and after sales support.

The physical deliverable cost includes construction materials cost, electrical system cost, rail system cost, rolling stock costs and sub-system cost. The major contributor for the operational cost is the energy cost.

5.2.7 Client relationship

The nature of engagement with client is an important factor in determining revenue potential of the business model. There exist two kinds of relationship, long term and short-term relationship. A long-term relationship with client normally lasts around ten years. In this kind of relation the SYS is responsible for developing, operating and maintaining the complete rail system solution. Long term relationship build trust among each other and it's beneficial for BT in long run, which helps in securing more projects. In short term relationship, SYS is responsible for procuring the rolling stocks and developing the rail infrastructure system. Maintenance activity in such an engagement can be either just restricted to after sales support or fully fledged fleet maintenance. Operation of the system is taken care by the client or by private operator.

5.2.8 Distribution channel

All products and solution offering from BT's SYS are directly delivered to the customers through its direct sales force, sales agent or lobbyists. Other channels of distribution like selling on Internet or through distributors are not applicable in this industry.

5.2.9 Revenue structure

Selling products and solutions to clients generates revenue. Revenue generated can be classified into short-term revenue and long run revenue. Short term revenue is generated when the client relationship is short term where completed rail system solution is sold to the client as a package and revenue is generated at different stages of the project such as supplier selection, design completion etc. Apart from this one time selling revenue can also be generated through service offering like after sales service. This is primarily based on the contract terms. The contract terms can vary from fleet maintenance to selling of spare parts.

For long-term engagement, revenue can be generated through the engagement period. In this operation and maintenance of the rail system serves as a source of revenue. Revenue is generated from selling of tickets to the end passenger or charging the clients for the operation provided on flat rate basis etc.

5.3 Evaluate the current BM

High cost lead to high price, BT fail to address low cost needs

In the current value proposition, BT focuses on the high complexity passenger trains. Therefore the engineering cost is high, comparing to competitors (Luger, 2011). And most of the BT products are manufactured currently in Europe, which also contributes for high cost. There are recent shift to enlarge BT footprint in low cost countries like China and India; but the new factories are not up to European standards in terms of production.

BT has technology advantage for its product portfolio; this has been important selling point in serving advanced European customers where features are very specifically defined and requirements are high. By focusing here, in the current practice, BT failed to address the low cost needs of potential market. Railway project usually involve huge upfront investment from government. Without good existing infrastructure as many European countries enjoy, the initial investment lead to number of aborted railway development plan. The current business model of BT, particularly make and sell rolling stocks, has limited market size compared to the potential market size.

Highly customized products

In the railway industry, major customers are government bodies, as shown in the customer segmentation. Therefore, BT serves a few major big customers that bring in most of the revenues. All these customers are served with high level of customer attention and most of customer requests are being taken care and implemented. BT is organized to cater projects like this, when small size order comes in, the same setup of project would require higher cost than the profit small size orders could bring (Mueller-Atzerodt, 2011). The practice of standard product is not established.

Short return period for projects

For SYS existing BM, the system implementation contract normally last till the completion of the railway system, be it mainline, airport shuttle or urban tramways. As the construction period normally takes a few years, the return period ends along with construction activities. When the railway system starts generating revenue, BT doesn't benefit from that. Comparing the lifetime of railway system, which is up to 30 years or more, the returns generated on construction of such system is rather short and to a fixed amount. And this amount would represent up to one third of all the revenue (Ertl, 2011).

Small service business

Together with the previous point, system implementation contract and service contract are normally awarded separately. And SYS captures the short-term construction phase revenues. Therefore, only in occasional cases there are long-term service contract served by SYS. The long-term business is where higher profit margin lies, and BT does not have a clear strategy and procedure how to address this issue.

Lack of focus

BT has the capability to cover all the activities in railway system. This gives the expertise and insight in the industry. However, this also means that there is lack of focus in the product portfolio. Divisions in BT compete and co-operate on project basis. There is no clear strategy or direction other than the existing market and offering such as the focus area for growth and new source of revenue generation.

6 New Business Model

In this section, new Business Model for BT SYS is described.

Upon analysing the industry trends and opportunities, it has been identified that the future growth opportunities lies in various areas explained in section 5.1. These opportunities were identified based on the growing needs of the modern transportation industry and they represent the potential opportunities that BT could appropriate. Out of these available opportunities, development of railway infrastructure and services in emerging countries was selected for further exploration. This was due the reason that it provides BT with a potential long-term revenue opportunity which could last for 30-40 years when compared to the existing 3-5 years time horizon. Apart from that these countries don't have any existing railway network, which means that BT potentially has an opportunity to develop railway infrastructure for the whole country. And most of the existing resources and capabilities of BT can be utilized effectively to appropriate this opportunity. It will also require BT to develop new capabilities, but they can be achieved through partner networks. Other identified opportunities help BT to grow in new areas, but they don't provide the long-term revenue stream as development of railway infrastructure and services in emerging countries.

Development of railway infrastructure and services in emerging countries means BT to enter a potential future market and establish itself as a major force in providing rail mobility solution provider at an affordable price to the customer. As rail mobility solution provider, BT will be responsible for developing and operating the railway network. To keep the cost low for such markets, it is appropriate to use refurbished trains, basic RCS system and no frills civil infrastructure. Developing a railway network in a country where there no existing railway infrastructure, would help BT gaining goodwill and strong customer loyalty. This will help BT in selling more services and products in years to come.

Analysing the needs of this specific market and comparing it with BT existing resources and capabilities, helps in identifying the changes required in the existing business model. These changes will enable BT effectively cater the needs of new market. The ability to provide required products and maintenance services characterises BT's current resources and capabilities. But the market requires more capabilities from BT in order to deliver the rail mobility services. The problem with emerging market is that the governments can't afford the magnitude of cost involved in developing the railway infrastructure. It requires BT to fund the development of infrastructure, purchasing of rolling stock and operational activities. This infrastructural requirement covers both civil and rail infrastructure.

In the current business model, when the SYS develops the infrastructure, revenue is generated through the upfront payment that customer pays for the deliverables (Hun, 2011). This payment acts as a revenue source during course of project execution. So the current model doesn't serve the requirement of emerging market. In order to overcome the need for financing the project in emerging markets, structural changes in business model is required. The major changes are identified in the partner network and key resources & activities. Predominantly SYS used to engage suppliers for developing the

infrastructure on contract basis. With the new business model, this bound to change. Apart from the existing partners, there will be few more partners ranging from banks to logistics companies who can help in funding the project. A detailed description of new business model is given below.

6.1 Business Model Description

6.1.1 Customer segmentation

Comparing the needs of emerging market with existing BM helped in the identification of lack of segmentation, which is vital in structuring the offering. According to (Porter M. E., 1985) segmentation helps the firm in focussing on the needs of very specific market, with which they could improve their profitability.

BT needs to distinguish the existing mature market and the emerging market for customer segmentation purpose. Here emerging market does not refer to the usual economical emerging categorization that includes the BRIC countries. Rather, the emerging market should be categorized in terms of rail industry development and those countries with very low existing rail presence. The market needs for railways in such countries are distinct from the mature market as no existing infrastructure and running system available and poor quality of overall transportation system. They are distinct from the BRIC countries as no big-ticket investment such Chinese government investment of \$109 billion on railway projects (China Daily, 2011) could be initiated from the local government. Therefore, a need for low cost solution identified.

In the emerging market, one critical factor for the BM to work is the possibility of private ownership of railway system. The railway industry is of strategic importance in certain countries, and these countries require keeping the ownership rail system to the government. Only till recent years, privatization become popular in Europe, where the history of railway can be traced back more than a century. Here, we assume that in these countries where no railway industry exists, law and regulation regarding it might also be lacking. The chance of shaping up the industry for BT and its partners are higher.

6.1.2 Offering

Rail mobility solution offering differs from the existing offering from SYS to provide competitive advantage, which will help in sustaining future growth. Competitive advantage as described by (Porter M. E., 2008) (Kim & Mauborgne, 2005) can be achieved either by focusing on existing industry structure or by reshaping the industry structure. Rail mobility solution aims at reshaping the industry by providing a means to move people and goods from point A to point B by railway network. The rail mobility should be provided with decent level of safety, comfort, availability, affordable and accessible for all kind of users associated with this system such passengers, customers who use services such as cargo, postal services, etc. Furthermore, mobility should be provided as simplified or no frill solution to keep the cost low.

Together with rail mobility, supporting infrastructure such as stations with ticketing system, waiting area, shops, security are provided as a part of offering. And they should be accessible from other mode of transportation. With rolling stock and stations, means for advertisement is identified as by-product offering for generating revenues. With

gathering of population, advertising space could be used to reach broad customers for commercial purposes.

6.1.3 Distribution Channel

Distribution of rail mobility is through sale of tickets to end passengers or rail service on duration/trip/passenger carried basis. These are closely coupled with revenue streams described in section 6.9.

The distribution channel should be made easy for passengers to reach if revenue is received directly from end customers. To experience long-term growth, retaining customer while expanding the service to reach more customers is the key. Sales of ticket can be through direct sales at ticketing office, ticketing agent, SMS ticket through the extensive mobile network.

6.1.4 Customer relationship

There are two broad category of customer involved in this BM, government and end passenger. Government is the customer and could be the co-owner of the rail system. If government invest in the project as a partner (c.f. partner network), then the relationship need to be built over long term and be nurtured with care and mutual benefit. Projected cost involved would be high. For end passenger, to provide simplified solution, self-service to a reasonable degree could be adopted while providing partial-personalized service. Cost involved in building such relationship should be medium to low. If the customers are aware of the benefit from lower price for the lower service level, as long as the mobility is delivered, the relationship should hold stable in long term.

6.1.5 Partner Network

This business model, which aims at reshaping the industry by providing rail mobility solution, requires SYS to possess capabilities, which it currently doesn't have. Capabilities such as civil, finance and operational capabilities are required to provide the identified offering, Dynamic capabilities which enables firm to develop new capabilities through partnership according to (Teece, 2004) can be used here to develop capabilities that are required for the new offering. By doing so, partners will take up activities for which SYS doesn't possess required capabilities. The partner network, which identifies such partner and their activities, will help by bringing their resources and capabilities for the project, which doesn't exist with SYS. Partners are classified into internal, external and contract companies.

BT's internal partners identified for SYS to be integrated for this BM include Service division, RCS division and finance function. Service division has the required R&C meant for refurbishing and servicing the trains. RCS is responsible for bringing R&C required for building of the rail control systems like wayside equipment and signalling. BT finance team will be responsible for structuring the financial deal in both short and long term with partners, identifying the source of funding and evaluating the risk involved.

Possible external partners identified for this rail mobility solution provider project consist of civil constructors, financial institutions, logistics companies and local government of respective countries. Civil construction companies, which undertake

activities, like construction of viaducts; railway stations are ideal partners for this project. Apart from providing their R&C for this project, they should also be capable of investing a considerable amount of money into this project. So it is necessary to partner with companies having good credit rating and also who are willing to explore new markets.

Financial institutions like banks, private investors and angel investors can be potential partners for this project. Their ability to infuse huge amount of funding makes them an attractive partners for this project. Investment banks such as Angel bank in UK, partly own the railway network. This kind of investment along with private investment organisation like private investors for Africa (PIA) can be potential partners for this project.

Logistics companies such as DHL or FedEx might also be potential partner/investors. Though they don't bring any R&C for building, operating and maintaining the system, they can be good source for financial investment for the project since transportation is large part of their business. Logistics companies by partnering with BT get network access for new markets, which is vital for their business. At the same time, logistic companies hold the capability of operating transportation in very efficient way that the partnership would apply in operation the system. This makes a win-win situation for both the players.

Local government can also be a partner in this project. Their contribution for this project comes in the form of real estate provider. Apart from this they can provide security to the asset that will be developed for this rail mobility solution. Here the government comes into the model not as solely customer, but investor. The benefit for the government thus can be share of profit together with the commencement of railway system.

Contract companies' are the key suppliers for this project. Due to work scope, SYS involves contract companies for building up of the rail infrastructure requirements for most of the systems project. Local contract companies can be hired to perform these tasks in this case. The R&C of these contractors will be used in developing the wayside system including track work, power supply and distribution, communication system and fare collection.

6.1.6 Key activities

Key activities are the tasks performed by different stakeholders in order to develop the entire offering. The offering of the project is rail mobility solution. In order to deliver this offering, activities that need to be carried out are building up of the system, operating the system, and maintaining the system and consultancy work. Individual activities were identified by comparing with the existing Gautrain project as explained in section 6.2.1.

6.1.6.1 System Building

Building the system involves all the activities to put the railway system in place. This has been done by SYS in different projects in various scales. The only differences for this BM are the negotiation content, financing methods and source of rolling stock. Activities

include first negotiation with customer, system design, financing, major construction activities like civil infrastructure, rail infrastructure, refurbishing the rolling stock, system integration testing, commissioning and then followed by operation and maintenance.

Negotiating with customer for getting the approval to provide rail mobility solution will involve activities like lobbying, marketing, communication to the local market etc.

System design will involve activities like identifying country specific rail mobility solution. This will involve identifying the travel requirement details, capacity, existing mode of transportation, potential partners etc. It will also involve identifying various sub components involved in them like number of rolling stock required, rail infrastructure required and civil infrastructure requirements like number of viaducts, stations etc.

Financing activities will involve activities like identifying the credit rating of the partners, structuring the partnership deal, detailing the amount of investment required, identifying the risk involved and pricing strategy to be adopted.

The civil infrastructure development activities in this project consist of building viaducts and railway stations and maintenance areas. This can be performed directly by the civil partner or through third party contractors. This will involve detailed planning, design and construction activities. If it is performed through third party contractors, then activities like identifying the contractors, awarding the contract and monitoring the progress of the project will be performed by the civil partner.

Rail infrastructure consists of track work, power supply and distribution, communication system and fare collection. These activities can be subcontracted to third parties, who will use their own resources and capabilities to build the rail infrastructure. In this case the partnership consortium will be responsible for selecting the suppliers and awarding the contract. Rail control system is another part of rail infrastructure, which could be provided by the SYS division internally. This includes equipment's used in rail signalling, interlocking system, level crossing and other operational control equipment. The main activity involved in building the rail control system is the procurement of equipment's from RCS by SYS.

Refurbished rolling stock that used in this project could be procured from SER. SER is responsible for procuring used trains from operators, refurbish them and sell the same. The partnership consortium will negotiate on the price and procure refurbished trains from SER. Resources meant for system integration; testing and commissioning will involve both physical and human resources from SYS and partners.

6.1.6.2 System Operation

Taking the ownership of the railway system, operation is the direct way to generate revenue. In order to operate the railway network, partnership will perform day to day and long term planning activities. Day to day activities will involve operating trains, controlling the signalling, operating ticketing system, procuring the fuel required etc. Long term planning activities will involve planning of staff required, schedule of trains, marketing the product etc.

6.1.6.3 System Maintenance Activities

Maintenance activities are performed to ensure the availability of train. This will be divided into rolling stock, rail infrastructure and civil infrastructure maintenance activities. Rolling stock maintenance will involve activities like repairing trains, monitoring the condition of trains. Rail infrastructure maintenance can partly be contracted to third parties contracts. The activity involved in this are identifying the contractors, selecting them and awarding the contracts. Activities involving maintenance of track work, power system, ticketing system etc can be handled by these contractors. Activities involving the maintenance of rail control system like signalling, interlocking systems can be handled by SYS. Civil infrastructure maintenance activities will involve maintaining upkeep of stations, monitoring the condition viaducts, stations and carrying out repair work if required.

6.1.6.4 Consultancy

Apart from lack of funds for infrastructure developments, the emerging markets operators also lack the capability to operate the transport system efficiently and maintain them in a cost effective manner. BT and its partners, who will be responsible for developing the system, can teach the local authorities for effective handling of transport system.

Apart from this they could provide consultancy on new infrastructure developments activities, which would empower the local authorities in developing their own transport strategy and implementing them.

6.1.7 Key Resources

Key resources involved in the execution of above key activities can be classified into tangible resources and intangible resources. The tangible resources consist of human capital and physical resources. The resources required for the activities are contributed from both SYS and its partners. Interviewing internal industry experts as explained in section 4.1 of this report helped in identifying these resources.

SYS human resources like advance engineering, procurement, project management along BT's finance, legal and partner's human resources will be used during the system design, financing and negotiation stages of the project. In the later stages of the project, when system building, integration, testing and commissioning are carried out, both SYS and partners physical and human resources will be involved. The physical resources will be the equipment, construction materials and machineries used for construction, integration and testing activities. The human resources utilized at this time will be both blue and white-collar workers. White-collar workers will be used to supervise and monitor the progress of the project. This activity will be performed by the project management team. Civil partner can use his own resources or sub contract civil construction activities to third party players. Similarly SYS can use third party resources for constructing the rail infrastructure. During the system integration, testing and commissioning phase of the project, human resources like engineers and managers will be other blue collar workers required will be drawn from both SYS and partners involved.

Operation activity will involve human resources meant for operating the trains, railways stations, ticketing machines and another important resource that will be used in the operational activity is the physical resource in form of energy required operates this rolling stock. Diesel fuel will be used here for operating the trains. Maintenance activities will require both physical and human resources of both SYS and its partners. SYS resources will perform the rolling stock maintenance activities; Service technicians, supervisors and managers will form the human resources required for this task and physical resources will be the equipment's used for service activities. Activities involving maintenance of rail infrastructure will partly involve SYS resources and partly from third party contractors. For maintaining the civil infrastructure, physical and human resources from the civil partner or third party contractor will be used.

The intangible resources include intellectual resources, brand image and financial resources. The intellectual resources include patents, copyrights, and highly experienced people. The brand image of Bombardier Transportation is used to market the products and offerings high in reliability and quality.

6.1.8 Cost Structure

The cost structure can be classified as staffing costing, physical deliverable cost, integration & testing cost, Operational & Maintenance cost and other miscellaneous cost like spare parts and service tools. Staffing cost can be classified based on different stage of the project as structured in the activities. During the initial phases of the project, there are significant human resources cost associated with system design, financing, project management and negotiating with customer. During the construction, integration and testing phase the cost structure is driven by the physical resources like construction materials, equipment's used for construction and human resources associated with construction and managing the same.

During the operational phase of the project cost is primarily driven by the energy charges and human resources employed for operating the rolling stock, control system and for other planning activities. Human resources such as technicians, service engineers and managers coupled with physical resources like tool box and those required for servicing a train contribute towards the maintenance cost.

6.1.9 Revenue Structure

By setting up the entire railway system and keeping the ownership, several ways to generate revenue are identified. A brainstorming session was conducted as explained in section 3.5.2 was used to identify different sources of revenue sources. Selling rail mobility solution directly to commuters or to end passengers generates revenue. Apart from this revenue could also be generated by selling advertisement spaces in train. Other than passengers, transportation service of goods for logistic company can also contribute to revenue stream.

Commuters who avail rail mobility solution can be either charged on fixed rate basis or on discriminatory price basis. In the discriminatory pricing method, tickets can be sold at a cheaper price at the beginning and at later stages as the travel dates become closer, tickets are sold at a higher price. The price of such flat rate and discriminatory pricing

tickets will be based on the distance of travel. Apart from charging the commuters; the local government can be charged for the services offered. These charges can be either flat rate basis or passenger count basis. If passenger count is used, then minimum ridership has to be guaranteed by the government.

Transporting low tonnage cargo like postal, domestic goods can also generate revenue. Here the charges can be based on weight and size of the goods. Leasing out space for postal companies or courier companies can also serve as a major source of revenue in this. Cars and trucks can be transported as roll on and roll off concept in between cities. Revenue can be generated for each of this trucks or cars. Apart from this revenue can be generated by leasing out advertisement spaces and shops in railway stations.

6.2 Financial Details

To ensure the validity and feasibility of the proposed Business Model, financial analysis was carried out to support the business logic. A plausible scenario is presented as followed.

6.2.1 Sample Project Chosen

A specific country in Africa was chosen, where this BM could be implemented and revenue can be generated through its operation. But African continent is so diverse, that there are considerable differences in political, economical and social differences among them. And most of the countries are in post war development phase. The rail infrastructure is almost a non-existent in most of the countries. The rail network density of Africa is 3.2 km/thousand square km. The selection of a specific country was achieved after analysing the macro-economic parameters. Parameters such as GDP, projected growth, per capita GDP, population density were analysed as a part of macro-economic analysis. For industry with high initial risk and investment coupled with long term return on investment, political stability of the market is a factor to be considered as well. This is an issue in number of areas where war, terrorist, corruption are increasing threat that would affect the result of implementation and execution of the proposing BM. One indicator can be used to evaluate over risk is the *sovereign credit rating* for different countries.

These parameters were helpful in identifying the areas where a railway network would benefit both the country and BT. By having a network established in a place where there is considerable per capita GDP, stable political condition and a good projected GDP will ensure that the consortium can generate enough revenue to sustain itself. With this consideration, twenty-two countries with high GDP were analysed and Cameroon was selected for demonstrating the validity of this BM. Cameroon experiences a stable political condition; economy is diversified in nature and above average projected GDP for coming years.

Table 1: Factsheet about Cameroon (2010)¹

Population	19,294,149
GDPppp	44.65 Billion \$
Per Capita GDP	2300 \$
Projected GDP growth	2.8%
Country's Credit rating (S&P)	B; Outlook Stable
Economy	Oil & agriculture
Political condition	Stable

In order to identify a potential area for developing the proposed railway network within Cameroon, micro-economic analysis was performed. In this Cameroon's population density, existing transport network and industrial activities were studied. Railway network connecting three cities in northern Cameroon was chosen. Cameroon has just 1000 km long railway network and this was developed in the year 1911 (Trainweb, 2004). Economic growth is affected by such poor infrastructure, as it hampers in the movement of goods and people from one location to another (Sodecotton, 2008). This network will help in improving the social status of the people living in that area, by providing access to high quality transport network at an affordable price. The access to quality transport network will enable them to access better medical care, easy transportation of domestic goods, inter market trading of goods and services and better job opportunities for the local community. All these things will result in having a positive impact on the economic status of that region.

The details of three cities that can be connected by implementing the network are listed below.

Table 2 Proposed network details

	Garoua	Maroua	Nagoundere
Population	436899	319941	231357
Existing transport network	Intl Airport, Road	Airport, Road	Airport, Road, Rail
Economic activity	Agriculture, Tourism	Agriculture	Mining

By having network between these three cities, it is possible to connect Garoua and Maroua, with existing railway network at Nagoundere. This will enable seamless transportation of people and goods north to south of the country. The economy of the northern region is primarily dependant on the agriculture and cotton industry. It is the fifth largest source of foreign exchange for the government and has a turnover of 0.15 Billion Euro (Nyuylime, 2006). The main activity of this industry is manufacturing and processing of cotton. Close to 90% of end product are exported to European markets. This export industry is plagued by bad condition of roads, non-availability of trucks for transporting and high energy prices (Sodecotton, 2008). The proposed railway network

¹Central Intelligence Agency(CIA) The world factbook

will alleviate the problem faced by the industry and also contribute for the growth of region. This will also enhance the tourism industry in that area.

6.2.2 Cost structure

For an entire railway system project, building blocks are civil infrastructure, railway infrastructure, and rolling stocks. According to the scale and scope of the civil infrastructure requirement, the cost of the system varies significantly. Here we consider the basic situation where one railway track is placed on fairly flat land with number of rivers to cross and stations in major cities and towns it passes by. The price of real estate (land) is considered to be low, as we are considering emerging countries in Africa. Cheapest system excluding rolling stock can be built at 2.4-mil euro per kilometre with single track and simple signalling. For a total of 500km railway system, the maximum total expected cost is **1.2 billion euro**.

The cost break down is calculated by benchmarking the price (as on April 2011) of 80 km long Gautrain project in South Africa. Gautrain project is double track with 15 km of tunnel in the city center and 50 bridges in an 80 km track. There are 10 stations along the way and some of them are of world highest standard, c.f. Appendix IV for a picture of Gautrain station. Rolling stock used in this project is high-speed electrified trains manufactured by Bombardier in the British site. There are onboard and off board signalling system.

Table 3 BM Cost Structure

Item	Gautrain Price (€)	Cheapest Price/km (€)
Civil Infrastructure	ca. 1.2 billion	1.2 million
• Viaducts	X mil	negligible
• Tunnels	X mil	n.a.
• Stations (10 stations)	X mil	3 mil/station
• Connecting Road etc	X mil	n.a.
Rail Infrastructure	ca. 600 million	1.2 million
• Fare Collection	X mil	negligible
• Communication & Radio	X mil	Part of signalling
• Track work	X mil	1.2 mil
• Signalling	X mil	6K
• Power supply & distribution incl. catenaries	X mil	n.a.
• Depot equipment	X mil	negligible
Total	ca. 1.8 billion	2.4 million/km

The cheapest price for the proposed system is calculated with minimum requirements. Therefore, tunnels, which represent significant cost in the civil infrastructure portion, can be neglected. Since we are looking solely at point-to-point railway system, the connecting roads etc. are not of this project concern. The rolling stocks to be employed for this BM are the refurbished diesel trains. Therefore equipment for electrified rolling stock such as power supply and catenaries are not required. For the Gautrain project, automatic fare collecting machines are installed in stations with the high first class

standard. In our BM, fare collection should be as cheap as possible, and as easy as possible. Manual collection would be preferred as we predict very low labour cost.

Rolling stocks in this BM, as mentioned above, are going to be refurbished diesel trains. As discussed with service division, the availability and life cycle of refurbished diesel trains fulfil our requirement for this BM completely. A refurbished train from Germany (purchase from Deutsch Bahn and refurbish in Europe) would cost 1 mil euro in total. And the lifetime of a refurbished train would be around 15 years with proper maintenance.

Table 4 Cost of Rolling Stock Comparison

	Gautrain	New Diesel Train	Refurbished Diesel Train
Train Cost	ca € 8 mil	€ 2.2 mil (Alstom)	€ 1 mil maximum
Maintenance cost	High	Low	Low
Life time	30 years	30 year	15 years

The cost breakdown of refurbished diesel trains is shown below. The maximum cost of a finished refurbished train is less than 1 million euro. The market price of the refurbished train is higher than the cost, but here, since it is internal capability of Bombardier, the sheer cost is considered in the calculation.

Table 5 Refurbished train cost breakdown

Items	Cost (estimated)
Old train set	€100,000
Motor, reliability (new diesel)	€100,000
Gear overhaul	€20,000
Signalling, and safety equipment onboard, new	€150,000
Carbody, 15 years old, light repair and repaint	€50,000
Bogie, Wheels, brakes	€100,000
Aux HVAC	€100,000
Misc	€200,000
Total	€820,000

6.2.3 Source of Investment

For project as described in the earlier section, the purpose for economic development and increasing living standard of local population is highly encouraged by various global aid organizations. There have been examples of World Bank, African Development Bank, the African Union, the United Nations Economic Commission for Africa and the International Monetary Fund to fund similar transportation project. A short summary of projects and their funding are summarized below:

Table 6 Transportation Project Source of Funding

Funding Organization	Project Title	Amount
IDA	Sao Paulo Metro Line 5 Project	US\$650 million ²
EIB	Westmetro Helsinki	€350million ³
AFD	Tunisia airport project	€70 million ⁴
IMF	N.A.	up to a maximum of 280 percent of its IMF quota under a three-year arrangement e.g. Botswana US\$391 million ⁵
AfDB	Projet d'augmentation de capacité de l'axe ferroviaire Kenitra-Casa-Marrakech, Morocco	€250 million ⁶

In order to fund this project, it is advisable to approach these funding agencies to secure loans and grants. Transportation project are of high importance for these institutions to place their funds. Therefore, it is advisable to approach all these listed institutions for funding, on top of private investors and funds. One point to note here, many institutions accept government loan.

6.2.4 Revenue streams

Sales of ticket

The most direct beneficiary of a railway system are the passengers who travel on it. For the proposed market, with faster, safer, and more reliable transportation provided, it is still important to keep in mind that the customers are price sensitive. To come up the ticket sales revenue, the railway ticket price for the existing network in Cameroon was studied and scaled by distance. A reasonable total price could be €10 for the entire trip. With 300 passengers per trip, 4 trips per day. Annual ticket sale is €4.5 mil as the system start running. More passengers are expected with the economic development that the system could bring, so the annual ticket sale could reach €10 mil.

Business clients

Fast and reliable transportation can benefit various industries in their business. Some identified potential business clients include retailers, logistic companies, mining companies, and local industry with exporting goods. All these businesses could make use of the proposed railway system, and fees can be charged for these services. Agreement for these business clients can be made through various ways: dedicated train cart rental; charge by weight of goods transported; charge discriminated fee for

²Worldbank project

<http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=40941&menuPK=228424&Projectid=P116170>

³ EID project <http://www.eib.org/projects/pipeline/2009/20090409.htm?lang=en&>

⁴ AfDB news <http://www.afdb.org/en/news-and-events/article/afdb-invests-eur70-million-in-senegals-new-airport-project-7635/>

⁵ IMF poverty reduction and growth facility (PRGD) <http://www.imf.org/external/np/exr/facts/prgf.htm>

⁶ African Development Bank Group <http://www.afdb.org/en/projects-and-operations/project-portfolio/project/p-ma-dc0-003/>

different goods; handling fee; defaulter fee etc. When these business clients make use of the railway system, it would also stimulate the economic development. This circle could go on and on: more developed railway system would be required and more economic growth in the region. It is not an easy task to estimate how much these business client could bring in revenue. However, an investment of €1 billion should result in 3 times return in benefited business, which is €3 billion according to a study in US (Cambridge Systematics, 1999). Though a direct scale up is not most reasonable in Africa, but the reasons behind the business growth potential are the same. For selling carbon ticket, CDM proposed the price of \$30 per ton of carbon. For transportation project that approved for claiming carbon ticket, annual carbon reduction varies from 17k ton to 248k ton (CDM, 2011). This translates to \$0.5 mil to \$7.4 mil. As the calculation of carbon reduction is very complex, a simple benchmark of the project scope gives us about 2-3 mil dollars revenue of carbon reduction for the sample project.

Advertisement

With establishment of railway system, population would gather in the stations and on board. Therefore, the advertisement potential to wide audience is created. Advertising is an integrated part of business development and an important source of revenue for the railway system owner. In Hong Kong, the revenue generated through advertising in stations was HK\$3,715 million in 2009. More advertising can be made at mobile phone SMS ticket, online website, printed ticket etc. The advertising income would be expected to grow with local economic development.

Real estate

As MacDonald BM on real estate, where MacDonald earn as much from real estate business as the revenue from food business, land value with introduction of new railway could increase with time due to the land's utility value for more business activities. Therefore, it might be a feasible BM around real estate business. This business can pursue different direction. Buy and sell land could be feasible in long term return; local tax on value of land can be imposed by the local government. More can be identified with closer study of real estate industry.

Consultancy

Consultancy service can be provided in terms of not only railway related matters, but also business consultancy. For Greenfield project such as the one proposed in Cameroon, city planning, business development, industry planning etc are all possible field where developed world knowledge could be utilized and help the local economic development. Therefore, a market for such consultancy work would emerge and revenue could be generated through this. The amount of potential revenue to be generated is not a predictable figure here. However, from what developed countries have experienced, the market could be enormous.

In summary, the total revenue could be generated through the railway industry can be easily exceed the investment needed. However, some of the revenue is not directly collected by the railway owner. The local population and government would benefit the most; therefore, certain kind of tax could make the BM feasible for the railway investors. With 15 years' time span, it is feasible to get back investment and make profit

from the railway system. And more advanced system, rolling stock and services would be required in the region just as much as the European market for BT today.

6.3 Evaluation of New Business Model

For BT to realize the proposed BM, the current resources and capabilities are examined and evaluated against the new BM. Reorganization activities of existing resources to appropriate the opportunities can be classified into four types: utilize what BT has been good at; expand certain existing R&C meet higher demand; develop new capabilities; and outsource and manage some activity that is outside of BT's core competences. A brief summary is presented below.

6.3.1 Utilize existing resources and capabilities

Strong project management skill for large scale project of BT SYS must be utilized in the proposed BM. This capability enabled BT to take up the lead in the designed partner network, and gives BT the decision power in executing the later phase of mobility provider towards its own favor.

Local footprint practice should also be adopted for projects in emerging countries like Cameroon. Local employment and local production would not only bring good-will of BT as a company in local content, but also drives down the labor cost for the product in discussion. BT has been very successful establish local footprint in Asia, the same practice would be carried on in Africa.

With years of experiences dealing with governments and authorities, capability of lobbying and decision making influencing are some of the important intangible assets for BT, especially when building relationship with new customers. It is important to keep the sales people convinced with the rail mobility provider concept and establish it to the potential markets.

6.3.2 Expand existing resources and capabilities

To reduce the cost of the railway system to satisfy the basic mobility requirement, BT could expand of the existing rolling stock refurbishment capability for more robust and durable products. The key criteria for refurbishing rolling stock should include easy operation and maintenance product and low cost to build.

With engineers in BT currently aiming at high end complex technology equipped rolling stock, to realize this new BM, different skill set need to sharpened and reviewed. This would require mainly expand the basic functioning RCS capability, on top of the refurbishment capability. One key factor here is again the cost, and since RCS is not sold directly to customers but serve as part of the package, this is one way to reduce the total cost of the railway system.

6.3.3 Develop new resources and capabilities

BT needs to focus in developing specialized financial skills and knowledge, in fund raising and development aid, for their customers and for funding their own project. This plays a key role for the new BM, as the risk and rate of return could be reduced or shifted from BT for the initial investment significantly. The more fund could be raised, it is more likely BT could make more profit in the short and long run to be the rail mobility provider.

Despite the possibility of partnering with the existing railway operators, operation capabilities can be developed internally for BT. Currently BT SYS is operating driverless systems in several airports, and certain skill sets are transferable and it is likely to develop full scale operation capabilities for BT utilizing internal resources.

6.3.4 Outsource and manage activities

With newly identified revenue streams, BT need not to develop and manage all streams internally but rather outsource and manage the B2B relationship with specialized firms. BT could connect with real estate and other sales channels for various services can be raised from the railway system. BT needs to manage the relationship for the best result, and the capability for managing such relationship, however, might need to be developed.

7 Result and recommendation

In this section, detailed recommendation to BT is presented

7.1 Summary

Modern transportation industry has been evolving with new characteristic and opportunities. Current trend identified in the modern transportation industry includes better integrated multi-modal transport system; development and application of intelligent transportation system; more cost conscious customers require cost competitive solutions; demand for efficient transportation system in terms of energy consumption and environmental impact; more safety, quality and experience focus for passengers; and though in early development, personalized transport system.

All these trends are relevant to Bombardier. Combined with BT's resource and capabilities, business opportunities that could lead to growth of BT are provider of intelligent transport system; financial services support the fund raising of transportation project to reduce the customers' cost burden; consultancy services in auditing railway project, O&M practices, and administrative capabilities; and provide transportation system in emerging countries. This project later developed mainly on the last opportunities, which aim emerging countries.

The main point of the new BM is for BT to partner with various industry players to become a mobility solution provider in the high economic growth potential countries. Differ from the technology leadership strategy in the existing market, this solution for BT include the simplest possible railway infrastructure and refurbished rolling stock for the possible lowest cost. And BT together with partners, take the ownership and ridership and profit from the railway system in the long run.

7.2 Evaluation

With vague pre-defined scope, this project has experimented with several directions to arrive one clear Business Model setup. With limited time frame, the project covers literature study, market study, company internal competence study, business model mapping and development, financial data collection and calculation. The modern transportation industry is complex and volatile. Bombardier Transportation is a large and complicatedly integrated organization. Despite all the effort examining and studying various relevant topics, it must be emphasized that this project serves as an exploration of possibilities for Bombardier, and neither the proposed business model being the best. More future study can be done and they will be presented in the last part of the report.

The result of the business model formulation, especially the financial details calculation, indicates that for BT to capture long term revenue, BT's risk attitude and expected return period need to be adjusted accordingly. Currently, all BT projects are paid back after infrastructure completion. This would not be viable for the new BM proposed. Calculation suggests that such new investment project would not be feasible if the return period is expected to be 5 years or less.

7.3 Future work

For the proposed BM, further examination on raising finance for the chosen Cameroon project could be further studied. We have shown that project in similar industry has been able to get fund and investment. However the right partners for partnership such as financial institution, civil partners and process details needs to be identified and mapped out. The task is trivial but the process could be very complicated.

Business revenue stream in the local context need to further explored and investigated with local knowledge and contact. Currently, the business revenue streams are of hypothetical stage of various possible scenarios. Some revenue streams might not be valid and more business opportunities might be discovered. Here, one direction of future work of this project is take a closer look on concrete, feasible and valid revenue streams.

As mentioned earlier, BMI are exploration by nature. For the proposed BM, more experiments and modification on different elements are possible and needed. Also to translate a BM into a business, more steps need to be taken to round up the BM, and make it adapt to the application market. This is no doubt a future work can be built on top of the current result.

In the business opportunities presented in Empirical Data Analysis, one possible next step is to start examine the possible BM to explore the rest opportunities. These opportunities were identified as most relevant and BT could capture with some new capability acquiring. To build business model around them could be the first next step in those directions.

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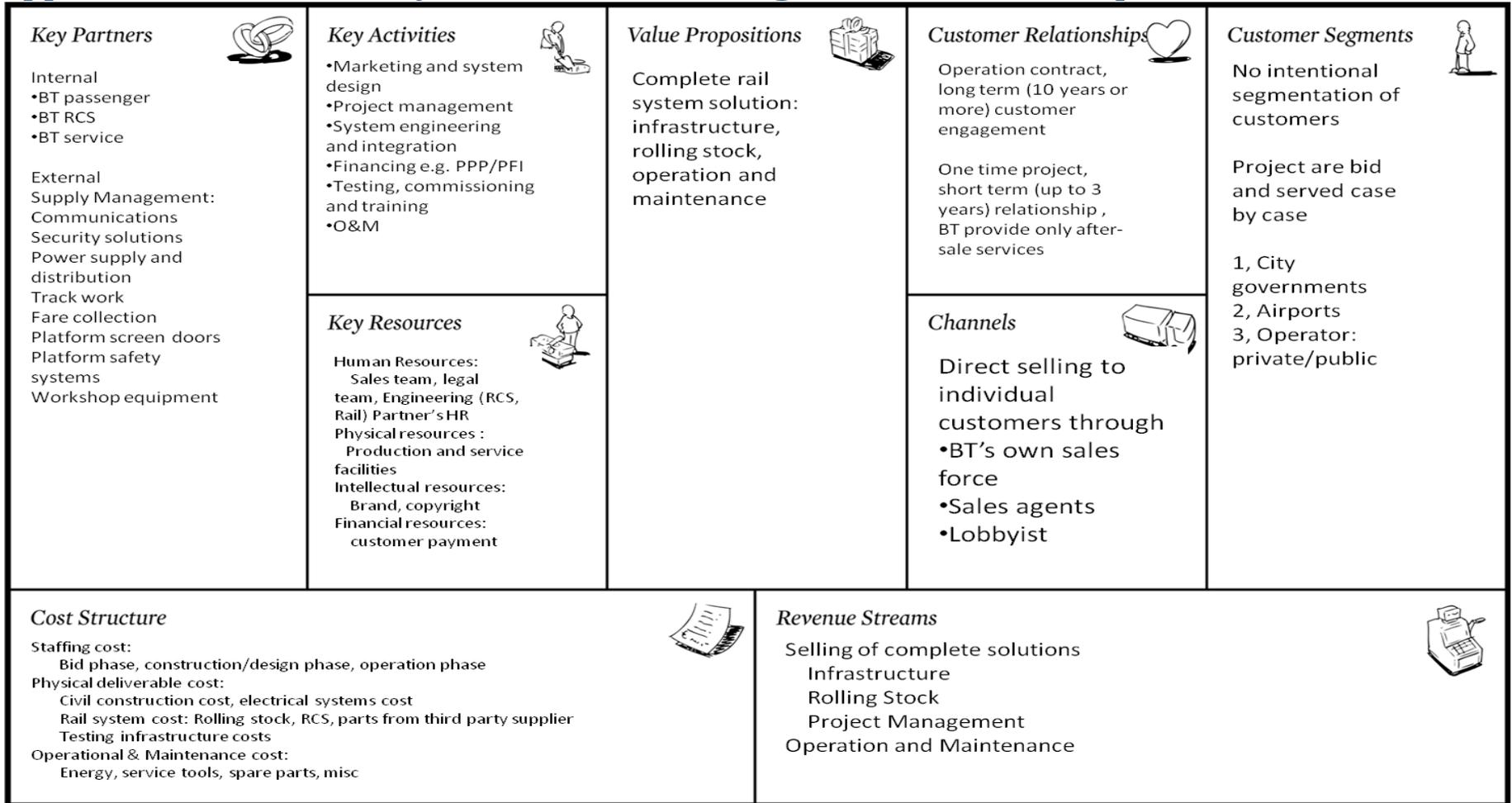
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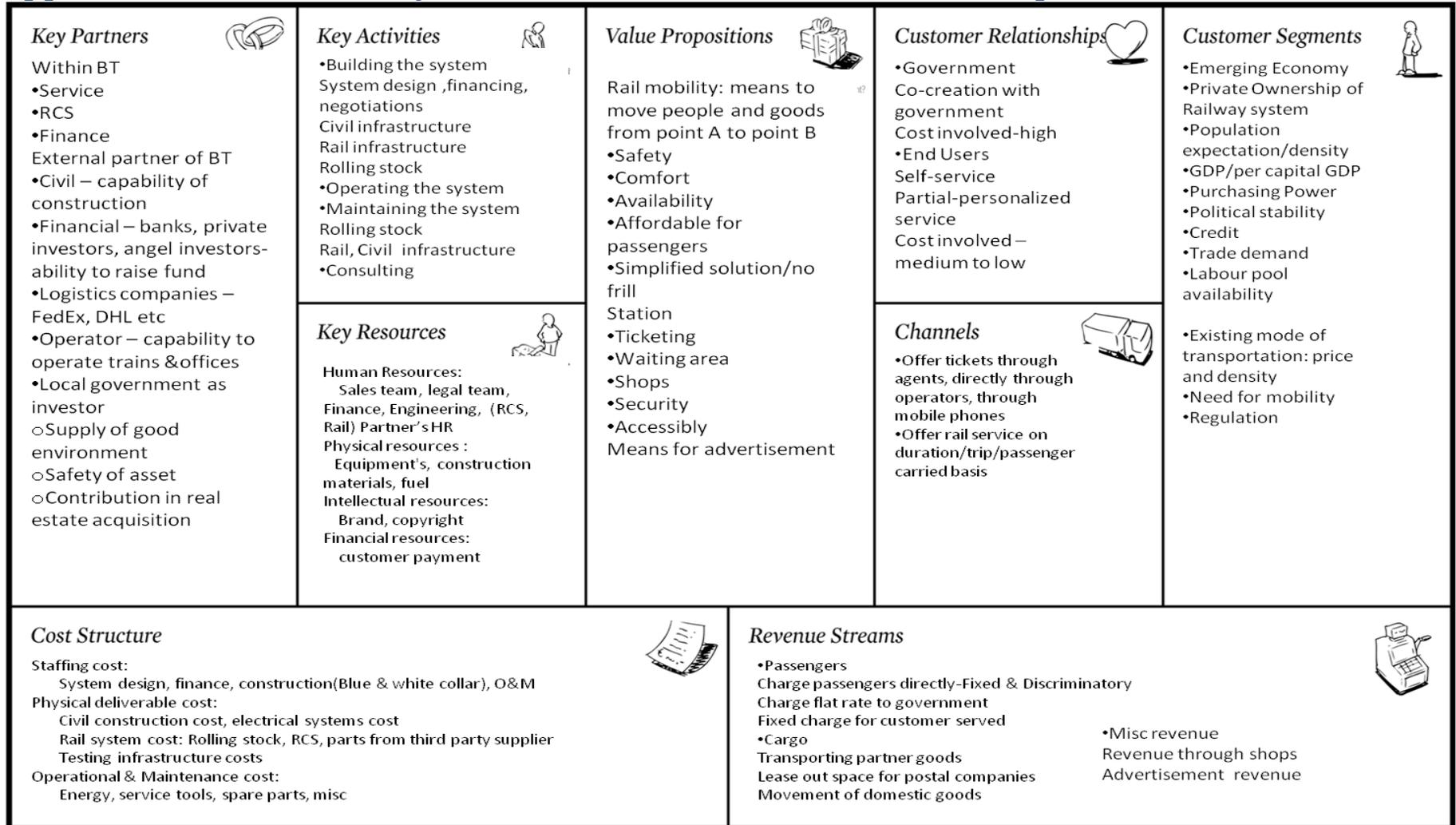
Appendix I: Interview Summary

Interviewee	Position Held	Purpose of Interview
Laurent Letourneux	Expert Innovation Mgt	Overview of IM practice in BT
Martin Ertl	Chief Innovation Manager	IM strategy,
BertrendParizot	Group Strategy Analyst	BT market environment, competition status, strategy planning procedure
Peter Albexon	VP Sales	BT Sales procedure, industry practice,
Joerg Thiele	Group Finance	Overview of finance function of BT
Robby Herbig	Structured Finance	Understand the role of this team in the sales process
Roger Bennett	Group Communication	Understand how communication taking place in BT in various direction
Tjark Siefkes	Project Management Director	Understand Engineering process and technology development practices
Stefan Duerrenberger	RCS Project Manager	Overview of RCS business model
JoostStrubbe	HR Director	Overview of BT HR strategy and practice
Klaiq Tahir-Ali	RCS Innovation Manager	Understand RCS area of innovation
Will Lanoe	SER Innovation Manager	Understand Refurbish train market
Silan Hun	SYS Strategy Director	Overview of system integrated project and approach, case study of Gautrain project
Katrin Luger	VP Group Strategy	Feedback of New BM storyline
Dirk Mueller-Atzerodt	SER VP PM& Engineering	Insight of Refurbish train business and cost involved
Volker Steven	SYS Controlling Director	Gautrain financial details
Chris Field-Buss	Gautrain Controlling	Gautrain financial details

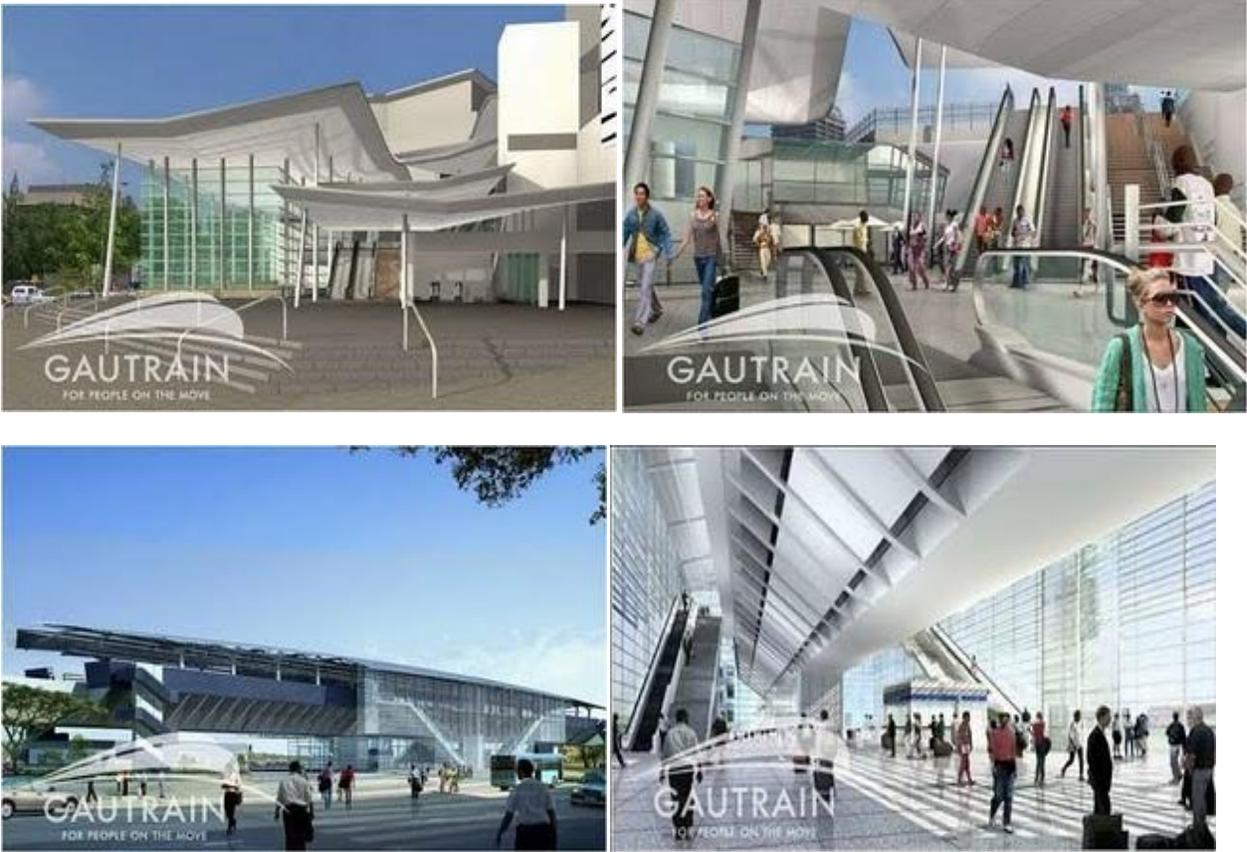
Appendix II Bombardier System Division Existing Business Model Graph



Appendix III Bombardier System Division New Business Model Graph



Appendix IV Stations in Gautrain Project



Source: BT internal document on Gautrain Project