

# A Study of B2B Business Marketing Plan: Mitsubishi Heavy Industries - Crystal Mover

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**Abstract:** *Mitsubishi Heavy Industries(MHI) is a global leader in delivering proven transportation solutions, with several decades of experience successfully supplying a broad range of advanced transportation systems for urban (intra-city and inter-city) and airport applications. This study made a B2B marketing plan for MHI to provide a LRT service for the one of the most famous resort city Macao and Macao people. By environmental analysis, industrial analysis, competitive analysis, and target market analysis, this study got a EFE(External factors evaluation) Matrix, a IFE(Internal Factors Evaluation) Matrix, a SWOT Matrix, and completed a marketing plan including hierarchy of strategies with a financial plan.*

**Keyword:** B2B Marketing Plan, Transportation, Mitsubishi Heavy Industries, Pearl River Delta

## 1. Background Information

Macao LRT is the fully-automated line will be worked by driverless rubber-type trains with a capacity of 100 passengers per car and it is preparing to order 158 cars for the system. Macao LRT will go with the trends of regional integration and sustainable development, contributing to the aims of Macao taking part in the development of the Pearl River Delta. As Mitsubishi Heavy Industries being the largest APM supplier in the world. Especially the Crystal Mover APM system offers safe and comfortable transportation with an unconventional design. It is a great opportunity for MHI to get the contract of the rolling stock and system for the first phase of the Macao LRT project which can benefit for MHI to further develop the Mainland China market in the future. MHI hope our train can make contribution in establishing an image of “the World's Travel and Leisure Center” of Macao and helping Macao to maintain competitiveness during the process of regional integration.

## 2. Introduction

### 2.1 Mitsubishi Heavy Industries, Ltd.

Mitsubishi Heavy Industries, Ltd. (MHI), a publicly held Japanese corporation. Headquartered in Tokyo, Japan and founded in 1870, MHI is one of the world's leading heavy machinery manufacturers, with consolidated sales of 3,349.5 billion yen in fiscal year 2013, the year ending March 31, 2014.

MHI's diverse products and services includes shipbuilding, power plants, chemical plants, environmental equipment, steel structures, industrial and general machinery, aircraft, space systems and air-conditioning systems.

MHI develops and manufactures many products designed to expand public transportation infrastructure and alleviate traffic congestion. Since 1981, MHI has successfully produced and supplied APM vehicles and systems for urban transport applications. The newly introduced Crystal Mover APM system offers safe and comfortable transportation with

an unconventional design.

### 2.2 Macao Light Rail Transit System

The Macao Special Administrative Government initiated the Macao Light Rail Transit system to provide the backbone for a citywide public transport network for Macao. It will serve the Macao Peninsula, Taipa and Cotai, serving major border checkpoints such as the Border Gate, the Outer Harbour Ferry Terminal, the Lotus Bridge Border and the Macao International Airport.

#### The Project

Macao LRT will be the first rapid transit system in Macao. The LRT was first proposed in 2003 by the Macao SAR Government. After the original proposal was rejected by the public, the decision to build the LRT was not made until October 2006. Site investigation work started in 2008. The office announced the construction plan for phase one on 17 October 2009, main construction work began in 21 February 2012 in Taipa, with the Taipa section to be operating by 2016 and Macao Peninsula section to be operating sometime on or after 2019.

The system will operate for 19h a day with a waiting time between trains of 3min during peak times. The Transportation Infrastructure Office is responsible for the project. Phase one will run along the eastern coastal corridor and connect the north-east boundary with Taipa. The line will be approximately 21km long and elevated. There will be 21 stations.

Phase two will include lines in the western harbor area and is yet to be finalized.

#### Infrastructure

Macao LRT will feature driverless vehicles. The capacity of each car will be 100 passengers. Provision will be made for elderly and disabled passengers. Screen doors, handrail escalators and lifts will be provided at stations.

#### Rolling Stock

Volume 8 Issue 6, June 2019

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Macao LRT will use automated guided vehicles and run on concrete tracks. In the phase one, it is preparing to order 158 cars for the system. The Transportation Infrastructure Office will call for tenders for supplying rolling stock and systems for phase one.

### Routes

The Macao LRT project includes three line routes in its basic proposal. Line one, to Macao Peninsula, will start from Barrier Gate (Portas de Cerco) and pass along Areia Preta, and Nam Van District before reaching A-Ma temple. The track length for this route will be 10km. There will be 15 stations and the journey time will be 20min.

The routes will include a 2.6km underwater tunnel and four underground stations. Line two, at Taipa, will follow the route from Sai Van Bridge (Porte do Sai Van) to Macao Stadium, Estrada da Baía de Nossa Senhora da Esperança branches, Cotai and Macao International Airport or Taipa Ferry Terminal. The track length will be 5.5km and there will be seven stations. The journey time will be 9min. Line three will travel from Estrada da Baía de Nossa Senhora da Esperança to Cotai city. The track length will be 3.5km and the journey time will be 7min. The routes will include a 2.6km underwater tunnel between Nam Van and Sai Van lakes and four underground stations.

### Signaling and Communications

A central control center will control the Macao LRT using advanced monitoring and communications systems. Automatic monitoring technology will be used to maintain a fixed distance between trains. The automated guidance system will help avoid accidents.

### The Future

The Macao LRT will eventually be connected to the Guangzhou-Zhuhai intercity rail system. The connection will help in integrating the two systems.

### 2.3 Crystal Mover

The Crystal Mover is an automated people mover (APM) system for airport and light rail applications. It is manufactured by MHI. The Crystal Mover is based on the Japanese APM standard delivered for the Asian and worldwide markets.

The Crystal Mover is a fully automated, rubber tired vehicle that travels on its own dedicated guide way. The system operates using proven signaling systems and provides a flexible, efficient, and reliable transportation solution that is ideally suited for a wide variety of applications including:

- Inter-terminal or terminal-to-remote facility links for airport complexes
- Links between urban activity centers and conventional

transportation nodes

- Transportation within private development complexes, theme parks, etc.
- Many other applications that require safe, reliable, effective, and affordable passenger transportation.

The engineering design of the Crystal Mover vehicle ensures safe operation, a comfortable ride, and excellent maintainability, while the unique, clean lines of the "crystal cut" exterior design and distinctive and spacious interior features of the vehicle have been precisely sculpted for maximum aesthetic appeal.

Furthermore, several vehicle and system features are versatile and can be easily customized and configured to satisfy a wide range of specifications and client requirements.

### 2.4 Ocean Cruiser

MHI has customized the trains that operate in Macao LRT called "Ocean Cruiser" which will use "water" as the theme. The design concept of a sea-resort city will be used in order to show Macao is a coastal city. The interior design of the train will customize the actual situation of Macao. The exterior color of Aquatic white and Deep Sea Blue represents the aquatic stratum, and the orange accent wave graphic at the side of the vehicle expresses the reflection of the sunlight. Passengers inside can obtain a resort-like beautiful scenery through the octagon-wide window at the front. The shape of the partition design and the stanchion pole are inspired by the sail. The motion circular design of the handrail to the stand pole inspires the movement of the water ripple. Therefore, the train that run on the Macao LRT can work as a sightseeing function which can make a great contribution to build Macao as a world tourist and leisure center.

### Design Concept

A city richly co-existed with sea-resorts is expressed in the vehicle design. Visual image for the Ocean Cruiser design:

- Aquatic Stratum
- Aquatic Clear
- Ripple, Wave
- Sail

### Design Motif

The exterior color of the vehicle is inspired by the aquatic stratum theme of Aquatic white and Deep Sea Blue. The reflection of the sunlight is expressed by the orange accent wave graphic at the side of the vehicle.

An octagon-wide front window is situated at the front end, which gives passengers a resort-like beautiful scenery from the inside of the vehicle.

### Interior Design

Based on the Aquatic Stratum theme, the color of the interior, seats and advertising space are coordinated in blue tone. The shape of the sail inspires the partition design and the stanchion pole. Translucent partition is used to give an aquatic-clear feeling.

### Interior Design Detail

The motion of the water ripple inspires the movement of the circles from the handrail to the stand pole.

### Specifications of the Train

Item	Particulars
Train configuration	Fixed married-pair vehicle
Capacity (passengers)	93 (including 8 seated)/car * 2 car
Tare weight/vehicle (tons)	16.8 tons
Vehicle dimensions (mm)	11 750 long * 2 690 wide * 3 725 high
Guide system	Side guided, two-axle, 4-wheel steering system
Electrical system (VDC)	750
Track gauge (mm)	1,850
Vehicle performance	Maximum speed, 80 km/h Acceleration, 0.97 m/s <sup>2</sup> Deceleration: normal maximum, 0.97 m/s <sup>2</sup> ; Emergency, 1.33 m/s <sup>2</sup>
Control system	Variable-voltage variable-frequency inverter vector control(VVVF) (load-sensing control with regenerative braking)
Braking system	Electrically controlled pneumatic brakes with regenerative braking (with safety brakes and parking brakes)

## 3. Executive Summary

Since the new large-scale entertainment projects and activities in Macao caused a rapid growth in the tourism and hospitality industries and these also push forward the increase in number of tourists, local residents and vehicles. These signify Macao's need for a high-capacity and multi-modal public transportation system to satisfy the demand for a more flexible and swift transportation network. Mitsubishi Heavy Industries, Ltd. plan to get the contract of the rolling stock and system for the first phase of the Macao LRT project. The contract contains a basic proposal which includes construction of the trains and LRT system. MHI has also opted to provide maintenance and supply more trains to increase passenger capacity at a contracted price. Besides provide the most cost-effective contract sum to the Macao Government, MHI are also focus on the environmental-friendly concept. We plan to provide the lightest train in order to minimize the structural changes that would need to be made to the Sai Van Bridge to enable it to carry the line. MHI's driverless trains will be operated automatically, running on rubber tires to minimize noise pollution as they will run through the Macao city. Moreover, MHI promise to employ local companies and local workers as maximum as possible, as well as provide technical training for local workers and skills transfer. We also plan to cooperate with the Macao's subcontractors to exchange technical ideas

### Wheelchair Space

Wheelchair Spaces are located at the middle seat row near to the door exit. By pulling the level beneath the seat, the seat will be folded up to create the wheelchair space. Anchor point to hook the wheelchair is also available under the wheelchair space.

### Front Window

The distinctive octagon front window provides wide view scenery from the interior.

in the construction and operation stage. MHI is committed to facilitating the establishment of the LRT in Macao, in order to improve the traffic and quality of living for people in Macao, promote the integration of the Pearl River Delta Region, and ensure a sustainable development for Macao's society and economy.

## 4. Situation Analysis

MHI is a global leader in delivering proven transportation solutions, with several decades of experience successfully supplying a broad range of advanced transportation systems for urban (intra-city and inter-city) and airport applications. MHI's transportation systems have already safely and efficiently transported hundreds of millions of passengers worldwide.

MHI is the largest APM supplier in the world, having been selected to provide more cars than any other APM supplier. Since 1981, MHI has delivered 16 APM systems. MHI's driverless, fully automated trains are the most advanced available, providing the highest levels of reliability, safety, and performance. In addition to the new APM market, MHI is planning to market APM systems in future for expansion, upgrades, and replacements to existing lines at numerous projects on a global scale. Building upon this record of success, MHI remains at the forefront of supplying reliable,

safe, and innovative transportation systems that will continue to drive the worldwide market and contribute to a more sustainable future.

MHI has strong resources and technology techniques to explore and develop market and foresees an excellent opportunity for supplying APM systems to Macao and even Pearl River Delta. This long-term agreement takes full advantage of the combined strengths to expand in large scale urban metro sector.

## 5. Environmental Analysis

### 5.1 PESTEL Analysis

#### Political

Nowadays, tourism has become the pillar of the economy in Macao. In recent years, according to the data statistics, Macao needs to receive nearly 30 million tourists per year. In order to balance the traffic problem, Macao Government has decided to plan the land transport policy for 2010 to 2020 and mainly to provide a more convenience way for the residents to go out, to decrease the influence for the environment because of the more and more motor vehicles in the city; furthermore, to build up a green transport city as Macao is a world center of tourism and leisure. For now, buses, taxis are the most important public transportations in Macao. Since the Guangzhou-Zhuhai Intercity Railway has been run for a long time, Macao Government has actively courted the urban railway and invested huge into it.

#### Economic

In the first quarter of 2014, the economy of Macao expanded by 12.4% year-on-years in real terms. Economic growth was mainly spurred by the increase in exports of services and investment. In terms of external demand, increase in exports of gaming services and total visitor spending supported sustained rise in exports of services. As regards domestic demand, gross fixed capital formation increased substantially, and private consumption expenditure grew upon favorable employment situation and rising incomes.

According to the research from Macau University of Science and Technology, the results showed that the overall social and economic benefits reach 158-164billion in the first two sections of the railway system. Thus if the railway system can be come into use, it will bring a huge contribution to the Macao economic.

#### Social

Macao is a very small place with 56.64 million residents. Also, it needs to receive over nearly 30 million tourists per year. Thus the traffic problem has been terrible for a while. We are facing the pressure of population, land and mechanization in the same time, the mainly method to solve the transportation problem is to build up the city railway system. It will be good for the city development, accelerate

the urban and regional integration, beautify the city sight, enhance the city attractiveness, upgrade the city image and increase the public's cohesive force and the identity.

#### Technology

Macao LRT is a low noise and zero-emissions green mass transit system. Base on the Guangzhou-Zhuhai Intercity Railway's experience and the physical situation, it adopts the rubber tire traffic system, the system is faster in the started and deceleration, usually used in the short distance rail routes. And the tire system also allows a smaller turning radius and steeper slope for the narrow roads in Macao. The design of the tire and the adaptation of electric traction, the sound of its operation are low and as a zero emission environmentally transportation, it won't make big impact for the surrounding residents.

#### Environment

Macao LRT is a low noise and zero-emission green mass transit system; it will be developed into the backbone of the transport network in the future in Macao. And it will also integrate with buses, taxis and pedestrians system into a public transport network in order to optimize the residents' travel environment and reduce the reliance on private vehicles. Thus the air pollution can be improved.

#### Legal

The Macao LRT in Taipa is expected to operate in 2016. How to manage the railway system after the completion, it needs a complete set a laws and regulations to support. The Macao Government has established the research teams led by the mainland experts and start to plan the relative laws and regulations of Macau LRT.

## 6. Industrial Analysis

MHI's APM systems are now expanding worldwide. Starting in 1998, the company installed its first APM overseas at the Hong Kong International Airport. This huge international airport hub introduced the system to efficiently transport people between its main terminal building and remote terminals.

In recent years, however, Japan's APM systems have gained attention as means of transportation within cities, and applications are spreading to urban areas as well. In Singapore, APM systems have been adopted in the country's new towns - satellite residential communities of populations on the order of 100,000 - with lines becoming operational in Sengkang New Town in 2002 and in Punggol New Town in 2004.

MHI designed and manufactured the "Crystal Mover" - the APMs delivered to Sengkang in Singapore - as its APM brand for overseas. The Crystal Mover has won Japan's Good Design Award twice, and its reliability in terms of design and functionality is highly valued. To date, a total of



169 cars have been delivered for ten lines in six countries.

### 6.1 Example of Different Cities

#### MHI in Japan

Since 1981, MHI has successfully produced and delivered driverless, automated transit systems for the Asian and worldwide markets. Prior to expanding into the global market, MHI was actively involved in the development and implementation of several major Japanese APM system projects that were based on the standard Japanese APM design.

#### MHI in Singapore

MHI supplied Singapore with its largest APM System in the newly developed towns of Sengkang and Punggol. This showcase intra-city transit system, featuring 33 stations, acts as a feeder - transporting surrounding residents to multi-modal stations connecting with subway and bus networks. The fully automated system provides safe, attractive, and cost effective transportation utilizing MHI's state-of-the-art Crystal Mover vehicles.

#### MHI in Hong Kong

The Hong Kong International Airport Crystal Mover APM system provides passenger transportation service between remote gates and the Main Terminal Building via a dual train way located at the basement of the building. Segregated arrival and departure services are provided either in shuttle or pinched loop configuration.

#### Bombardier in Guangzhou

The APM line at Zhujiang New Town is the world's largest underground driverless mass transit line. The entire 3.94 km APM line is being constructed underground and has 9 stations. The APM is running from Lihexi Station with stops at major buildings in Zhujiang New Town, the new CBD in Guangzhou, before reaching the terminal at Chigang Pagoda Station. The APM line is also connected to the Guangzhou Metro Line 3 at both Linhexi and Chigang Pagoda stations. It is expected that 50,000 people will be using the system every day.

The APM line at Zhujinag New Town is developed by Bombardier Transportation in partnership with Guangzhou Metro Corp (GMC) and Guangzhou Municipality. Bombardier's U.S. facility in Pittsburgh designed and supplied the 14 INNOVIA APM 100 vehicles and the Bombardier Cityflo 650 automatic train control system. Bombardier worked in partnership with GMC who supplied the power systems, communications and platform screen doors.

#### MHI in Macao

According to the several successful experiences in other places in Asia, MHI has confidence to do it again in Macao. Although Macao is different and more difficult than other places because it's very small and the landform is complicated. However, MHI owns a professional team and advanced equipment, no matter how hard is it, it will find out the best solution. Combine the experiences in Japan, Singapore and Hong Kong that will be more easily for MHI to set the plan.

## 7. Competitive Analysis

### 7.1 Porter Five Forces Analysis

The transportation infrastructure that supports our daily lives has been continuously evolving. At the same time, the concentration of growing populations in urban areas stemming from economic development is leading to serious traffic congestion and environmental degradation. As a means for resolving these issues, large cities are extending subway lines and expanding other public transportation systems. The increased economic burden involved in the construction and operation of these systems, however, has heightened the need for a transportation infrastructure that can be built and operated at lower costs. As an alternative to conventional trains and buses, monorail and LRT systems have emerged as new urban transportation systems.

#### Supplier Power

The materials of rail transportation equipment industry mainly include steel, aluminum, copper, decorative materials, motors, transformers, converters, control cabinets, high and low voltage electrical equipment, diesel engines, wheels, axles, gears, bearings, bolster, side frame, brake beam, pillow springs, buffers and couplers, etc. The suppliers are decentralized so that the risk of over-reliance on a single supplier is less. Thus the industry has some bargaining space with the suppliers.

#### Buyer Power

For Macao LRT project, MHI is a bidder, we should only have one buyer, is the Macau Government, so start from moment they call for bids, it have proved that they have demand on the help of rail transportation help. But the ultimate aim of the Government in this project is to serve the public; obviously, the end users of light rail must be Macao residents. So we need to consider the Government's needs from the current situation of public. Therefore, we could analyze the buyer power from the factor of ticket revenue. Ticket revenue is the major income of the city railway. And the price of ticket is the most important factor of the operational policies. For example, in 1989 to 1998, the proportion of ticket revenue took up 82.8% of the total revenue of Hong Kong MTR. It showed that the ticket revenue determines the operational efficiency of the city railway transportation. When the passengers are comparing the ticket price, they will consider not only the core product but also the actual product and the augmented product. It

cannot apply the public transportation system to decide the ticket price of the city railway.

### Competitive Rivalry

The city railway transportation equipment manufacturing is divided into vehicle manufacturing, communication signal systems, electric power and electric vaporization. The market competition of city railway transportation industry is limited. In the railway transportation construction industry, the regional construction companies came out one by one and gradually expand the market area. In the railway transportation vehicle manufacturing industry, the competition between the two mainly city railway companies in mainland china can improve the market development and technological innovation. Because the entry barrier of technical is high in the communication signal systems and electric power and electric vaporization area, the competition is stability among several companies. With the improvement of the technological innovation capability and lower technical entry barrier, the sufficient competition will be expanded gradually.

### Threat of Substitution

Under the highly competitive of the passenger market, no matter the city railway transportation or the bus transportation each has their own advantages. For different people, their sensitivity about the time, ticket price, safety and comfort are different. Thus the final attraction will be totaling different in the end. Also, in different areas, the difficulties of picking up the passengers will influence the attraction. And the different of travel distance will make different attractive to the passengers.

### Threat of New Entry

The entry barriers of railway transportation equipment vehicle manufacturers are high. First, those who want to enter the railway network operation need to satisfy the railway technical specifications and standards which include the materials, testing standards and design guidelines, etc. Secondly, only those who got the production license can bid the relative project. Overall, the technical standards and production license are the invisible entry barriers for the potential competitors. However, with the further liberalize trade, the railway transportation equipment manufacturing enterprises are facing bigger competitive pressures and it may loss the existing market share in the future.

## 7.2 Major Competitors

For the Macao LRT project, MHI has three main competitors, which are Bombardier Transportation, Siemens and DCC Doppelmayr Cable Car. Since they are famous on the APM system and each have very good transportation experience for many different cities.

Therefore, we following discuss these three competitors:

### Bombardier Transportation

Bombardier Inc. is a Canadian multinational aerospace and transportation company. In the beginning, Bombardier was a maker of snow machines or snowmobiles, over the years it has been a large manufacturer of regional aircraft, business jets, mass transportation equipment, recreational equipment and a provider of financial services. Until now, Bombardier is a Fortune Global 500 conglomerate company.

Actually, Bombardier Transportation emerged as one of the largest manufacturers of railway rolling stock in the world. On APM system, the Bombardier Innovia APM 200 is an automated people mover system (APM) manufactured by Bombardier Transportation. The Innovia APM 200 is the successor to the Bombardier Innovia APM 100 (formerly known as the CX-100). In fact, this design was in response to the popularity of the Mitsubishi Heavy Industries Crystal Mover, the advancements the Innovia APM 200 made over the Innovia APM 100 is a brand new aerodynamic design, allowing for greater speeds and tighter turns. The Bombardier Innovia features a full composite construction, and is offered with multiple end cap options.

It can be seen that Bombardier is a powerful competitor for MHI in terms of speed, capacity and design of vehicle.

Bombardier Transportation has production facilities or product development in Asia (India, China), Europe (Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Italy, Norway, Poland, Romania, Spain, Sweden, Switzerland, United Kingdom), North America (Canada, Mexico, United States), Oceania (Australia), and South America (Brazil) nowadays.

### Siemens

Siemens AG is a German multinational conglomerate company headquartered in Berlin and Munich. It is the largest engineering company in Europe.

Siemens has a wide range of products, services and contribution, such as offering electrical engineering- and electronics-related products and services, buildings-related products, industrial automation-related products, energy-related products, lighting products, medical products, and transportation and logistics-related products etc.

For rail transportation field, Siemens also has a very comprehensive product development, for example, rail vehicles for mass transit, regional and long-distance transportation, maglev train, locomotives, equipment and systems for rail electrification, central control systems, automated train controls and so on.

Although Siemens does not just focus on railway transportation industry, but its comprehensive strength should not be ignored.

Siemens APM systems develop attractive public transport in airport applications, as feeder line in metropolitan areas or as

backbone in mid- sized cities. Among the most famous are Skytrain in Bangkok, Velaro high speed train and Lausitzbahn Connex in Weißwasser in German.

### **DCC Doppelmayr Cable Car**

DCC Doppelmayr Cable Car is a supplier of APM based in Wolfurt, Austria. It is a subsidiary of the Doppelmayr Garaventa Group. Their main product is the cable -propelled CABLE Liner shuttle used in airports, city centers, intermodal passenger transport connections, park and ride facilities, campuses, resorts, and amusement parks.

DCC great emphasis on the design aspects of their trains, they claim that each APM's appearance is custom-tailored for its application and harmonizes with its surroundings and customize the train's car bodies enhances passenger enjoyment and adds to the system's functionality by increasing passenger load and security options.. The train design allows for many creative innovations, such as installing glass roofs for an indoor system.

Based on their experience and train designs on the APM system, it can be seen that DDC has a solid strength on railway transportation market.

International Airport Link in Toronto (Canada) and MGM CityCenter Shuttle in Las Vegas (USA) are famous DCC APM system in the world and they also are the brand products for DDC.

### **MHI's Competitive Advantages in the Macao LRT Project**

Through the above description for the respective companies, it can be seen that Crystal mover's competitors do not have a lot of experience in building transportation infrastructure in densely populated small city which like Macao. But most of MHI's transport infrastructures are built in some of the smaller cities and airports, where the situation is very similar to Macao.

If we individually analyze each competitor, we believe that the MHI's biggest competitor is Bombardier, because they have much experience from the light rail in many places, and their self-developed Innovia 200 APM which have superior performance will become a serious threat.

However, the fact that MHI also has the same advantages with Bombardier, except in the experience as good as Bombardier, they also developed its own trains, and they will coupled with the situation of Macau, using a low bruit and let the vehicles more suitable passing near residential areas with technology of rubber-tyred metro.

## **8. Target Market Analysis**

### **Why APM system is suitable for Macao?**

Macao as a tourist city, need a flexible and efficient means of transport, suitable for connecting airport facilities, theme parks, as well as links between urban centers and traditional transportation nodes and so on. Coupled with Macao is a densely populated and congested environments city. If Government wants to provide convenient services to the community, there must have a quick and safe transport system.

### **What technology enables Crystal Mover have better integration of APM system inMacao?**

Crystal Mover will use the rubber-tyred metro in Macao LRT; rubber-tyred metro is a form of rapid transit system that uses a mix of road and rail technology. The vehicles have wheels with rubber tyres which run on concrete inside guide bars for traction.

This design has several advantages for Macao:

1. More stable when moving (Compared to the traditional railway with steel wheels.)
2. Low running noise
3. Higher rates of acceleration and deceleration (Because of the friction of the tire itself to make it have greater relative force, the train can easily crawl steep (up slope: 13%) of the slopes.)
4. Walkable smaller radian bends
5. Shorter braking distances
6. Quieter rides
7. Greatly reduced rail wear with resulting reduced maintenance costs

### **Target Markets**

According to the characteristics of our products and services, it can be seen that this is a huge project, so we have to make many considerations in the target market.

Overall, we can go two ways to analysis the target market; they are the Macao Government and the people of Macao.

If we look from the perspective of the Macao Government, we should consider what the problems that Macau Government wants to solve are. As far as we know, Macau has been the problem of traffic congestion, regarding to this, it has had a lot of grievances, so to improve the traffic situation in Macao is a very pressing need. The second purpose to improve the traffic environment, it is possible to make economic development more smoothly, and can drive the growth of the tourism industry.

In addition from the perspective of the people of Macao, taking into account the people use of the light rail which are mainly the workers and students which need to spanned work and school, and also the middle-income people, so we believe that light rail should be close to residential areas will be more convenient to them and more cost effective. Still, it raised a

big problem when we build the light rail. While the light rail closer to Residential areas, in the people who vicinity of the construction will certainly be affected on the living environment, this may lead the public opposition.

Therefore, in this project, we need to make various considerations including the point of views of the Macao Government and the people of Macao. If we can be successful on the tender, we need to maintain close communication with the Government to come up a program which can meet the social development needs and less obstruction to the public.

## 9. Marketing Strategies

The nature of the strategy is choice. Because an enterprise has limited resources and capabilities, it must choose development strategies based on a strategic analysis. Strategic choice is an important part of strategic management. "How to choose business strategy" depends on the external strategic environment and themselves' state of the enterprise resource. Choose the right strategy is the key of proper development and business success.

Above all, strategic analysis is essential for strategy making.

### 9.1 External factors evaluation (EFE)

#### Principle of EFE Matrix

There is a tool to analyze the external factors evaluation which is EFE matrix. This approach is finding key factors, which influence the development of enterprise in the future, between opportunity and threat. Then, weight will be determined by the degree of factors' influence. High degree will get high marks and low degree will get low marks. As a result, we will get sum of weighted marks and average sum of weighted marks. By EFE matrix, enterprise can gather and collect the information of the opportunity and threat so that to evaluate the external situation included economy, policy, and culture and so on.

#### Factors in the Matrix

1. Factors of external environment included opportunities and threats in the enterprise and industry.
2. Weight (0.0-1.0) is based on industry. Total weight sum equals to 1.
3. Marks (1-4) of every factor are based on company. It means how the factors effect to the company. 4= good effect, 3= effect over average, 2= effect equal to average, 1= bad effect.
4. Sum of weighted marks not over 4.0 and not lower 1.0. ( $4.0 \geq \text{sum of weighted marks} \geq 1.0$ ) If company get 4.0, it means they have best reflection of opportunity and threat in whole industry. If company get 1.0, it means they have worst reflection of opportunity and threat in whole industry and company cannot avoid external risk.

#### Major Opportunity Factors

1. Macao plan to continue develop light rail.
2. Macao plan to make Macau Light Rail Transit System connect to near areas.
3. Macao require higher environment level of light rail building (green MLRTS)
4. Boom of after-building is coming. Software and repair will have a huge number of needs.
5. Policy support technology import and technology collaboration.
6. Macao hope foreign company provides better product and service.

#### Major Threat Factors

1. High competitive in the market.
2. The entry barriers of railway transportation equipment vehicle manufacturers are high.
3. Policy support local company development.
4. Rival makes a positive competition strategy.
5. Local companies are rising abruptly.
6. Local technology develops fast

#### MHI EFE Matrix

Key External Factors	Weight	Marks	Weighted marks
<b>Opportunity (O)</b>			
1. Continue develop light rail	0.10	4	0.40
2. MLRTS connects to near areas	0.08	3	0.24
3. Green MLRTS	0.12	3	0.36
4. Boom of after-building	0.05	3	0.15
5. Policy support technology import	0.10	2	0.20
6. Hope of foreign company	0.05	1	0.05
<b>Sum of weighted marks</b>			<b>1.40</b>
<b>Threat (T)</b>			
1. High competitive in the market	0.10	2	0.20
2. Entry barriers are high	0.05	2	0.10
3. Policy support local company	0.10	2	0.20
4. Rival's positive competition strategy	0.12	2	0.24
5. Local companies are rising	0.08	2	0.16
6. Local technology develops fast	0.05	3	0.15
<b>Sum of weighted marks</b>			<b>1.08</b>
<b>Total</b>			<b>2.45</b>

As a result, we can see the key factors: Continue develop light rail, Green MLRTS, Policy support technology import, High competitive in the market, Policy support local company, Rival's positive competition strategy. They have weights over 0.10. MHI positively reflect the plan to continue develop light rail, because of the mark is 4. Because total sum of weighted



marks lower than average marks ( $2.45 < 2.5$ ), so MHI has a little bit low level of use external opportunity and avoid external threat. However, sum of weighted marks of opportunity is higher than sum of weighted marks of threat ( $1.40 > 1.08$ ). Thus, when the company catches the opportunities, they also need to consider more about avoiding risk at the same time.

## 9.2 Internal Factors Evaluation (IFE)

### Factors in the Matrix

1. Factors of internal environment included strength and weakness in the enterprise and industry.
2. Weight (0.0-1.0) is based on effect to performance in whole industry. Total weight sum equals to 1.
3. Marks (1-4) of every factor are based on company. It means how the factors effect to the company. 4= important strength, 3= strength, 2=weakness, 1= important weakness.

### MHI IFE Matrix

Key External Factors	Weight	Marks	Weighted marks
<b>Strength (S)</b>			
1. Strong resource and capability advantage	0.12	4	0.48
2. High level of employee quality	0.10	3	0.3
3. Information Management System	0.05	3	0.15
4. High level of productivity	0.08	3	0.24
5. Good quality management	0.12	4	0.48
6. Professional after-sales service team	0.10	3	0.3
<b>Sum of weighted marks</b>			<b>1.95</b>
<b>Weakness (W)</b>			
1. Low sales performance	0.10	1	0.1
2. Technicians is limited	0.08	2	0.16
3. Cash return is slow	0.10	1	0.1
4. Corporate decision-making is slow	0.10	1	0.1
5. Lack departments communication	0.05	2	0.1
<b>Sum of weighted marks</b>			<b>0.56</b>
<b>Total</b>			<b>2.51</b>

As a result, we can see the key factors: Strong resource and capability advantage, High level of employee quality, Good quality management, Professional after-sales service team, Low sales performance, Cash return is slow, Corporation decision-making is slow. They have weights over 0.10. MHI positively reflect the strong resource and capability advantage

### Major Strength Factors

1. MHI has strong resource and capability advantage.
2. Staff and management structure is reasonable with the high level of employee quality.
3. Application of Information Management System.
4. MHI has a high level of productivity and production management situation continues to improve.
5. Quality management level continues to improve.
6. Professional after-sales service team.

### Major Weakness Factors

1. Marketing needs to be improved, sales performance is not ideal.
2. Technicians is limited, the problem cannot be solved in time.
3. Cash return is slow and financial problem will happen.
4. Corporation decision-making efficiency is not high.
5. Departments communication is lack.

and good quality management, because of the mark is 4. Because total sum of weighted marks a little bit higher than average marks ( $2.51 > 2.5$ ), so MHI has a little bit high level of internal situation. Thus, MHI need to keep the strength and consider more about improving weakness.

## 9.3 MHI SWOT Matrix

	Opportunity (O)	Threat (T)
<b>Strength (S)</b>	SO Strategy 1. specialized operation 2. differentiation	ST Strategy 1. focus on rival's customer 2. use research develop customer relationship and satisfaction
<b>Weakness (W)</b>	WO Strategy 1. strengthen communication among departments 2. training technicians and building talent team	WT Strategy 1. strengthen sales force and develop public relationship capability 2. improve cash return rate and financial situation 3. Cut cost from raw material and equipment, strengthen competitiveness.

## 9.4 Hierarchy of Strategies

### Corporate Strategy

Mitsubishi has a good image and develop trend in the whole train industrial especially in the light rail. This industrial has a high entry or exit barriers and Mitsubishi choose to use specialized strategy. For example, in Macao market, we focus on the light rail, and put effort to provide a best and professional technique support and service. Mitsubishi is a huge corporation and we have a strict department dividing. Every branch company does their own works and avoids business clutter. Mitsubishi Heavy Industries is one of the branch companies. Specialization not only bring efficiency to corporation but also appropriate to high-technology department like our Crystal Move program.

Refers to SWOT analysis, SO strategy is a strategy totally uses external opportunities and internal strengths. Specialization can make company focus on small segment and put more resource in there. It can attack rivals' strategy in wide area, and avoid waste investment in too more area. Nowadays, although more and more companies adopt differentiation, but it is not always appropriate for any companies. So we need research firstly, and make decision about enter new areas or not. Above all, we need focus on light rail and provide best service to our customers firstly.

### Business-Level Strategy

This part refers to SWOT analysis and use ST strategy. Company focuses on rival's customers. In Macao market, we have two groups to compete which are Siemens – CCECC Consortium and BT CRBC LRT Consortium. Our basic proposal lump-sum price is lower than Siemens – CCECC Consortium and a little bit higher than BT CRBC LRT Consortium. (\$ 6,281,592,632.00 > \$ 4,688,000,000.00 > \$ 4,567,143,775.07) So we need to analysis the advantage of rival and know more about the information of their customers. We may not grab their existing customers, but we need know what attract customers to choose them rather than us.

We have resource strength, and we need put more resource to provide better service and higher quality product to our customer so that build their loyalty. When they are satisfied, we can keep the good relationship and get the bid for further

program.

### Functional Strategy

This part focuses on WO and WT strategy. They are included marketing, branding, pricing, financing, and human resource. Company need to strengthen communication among departments to help different departments take a better collaboration. Because the technicians are not enough, so company should training technicians and building talent team right now. It is not only for now, but also for future. Enough human make company can expand market bigger and bigger.

Company should to strengthen sales force and develop public relationship capability. Marketing need marketing people and a successful sales force is important for a company. This team can help company confirm 4Ps to success. It also is a channel of communication to customer and passes our information to customer so that attract them. Company also need improve cash return rate and financial situation. Because big program usually make a slow cash return, company need to consider about the situation of lack cash. Cutting cost also is an old topic about a manufacturer. Development department need think about how company can reduce cost. It can be put effort from raw material and equipment, so that strengthen the competitiveness in the market.

## 9.5 Financial Plan

Macao Government has a budget for the whole project of light rail. In 2007, the budget of rail system, which is our providing, was MOP\$2,700,000,000. But in 2009, the budget had risen to MOP\$3.5 billion. Recently, the budget will increase to over MOP\$5 billion. The reasons are multiple, such as forecast mistake, exchange rate changing, plan changing, and so on. However, our revenue is increasing.

There is the Balance sheet (partial) of 2009-2011 and 2013-2015 (forecast)

Unit: MOP\$ Million	2009	2011	2013	2015 (forecast)
Total Assets	7,240.00	8,439.54	10,05.27	13,539.59
Total Liabilities	7,256.13	8,232.17	9,794.13	13,172.22

and Owner's Equity				
Balance	(16.13)	207.37	256.14	367.37

You can see that the net income is increasing. By whole group effort, the revenue is from negative to positive. As a result, revenue of forecast is MOP\$367.37 million in April 2015.

## 10. Alternative Strategy Evaluation

When we research and design the strategic analysis, we also consider more strategies. However, not every strategy is appropriate to us.

Traditional 4Ps analysis is a typical model to design a marketing strategy, but in this case, it is not very useful. Because, in B2B area, there are more complicated than B2C, there will be over billions funds flow in one proposal. Light rail belongs to railway building, and the target market almost always is Governments. So the traditional marketing mix needs to modify and we choose the SWOT analysis to decide our strategy.

Although there may be more and better approaches, we have done a completed analysis included many factors. It may not be the best, but it also is a better plan in nowadays.

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