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Engineering Report

Role of a Biomedical Engineer in Latin America as a Supplier of Medical Devices and Services for an Asian Transnational Company

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ABSTRACT

The hiring of biomedical engineers by an Asian multinational in Latin America is increasing. Chinese companies are expanding, and this professional profile is the most sought-after saliency by these companies. Biomedical engineers have multidisciplinary training to support multinationals in planning, finding potential distributors, and performing pre-sales and post-sales operations, thereby involving biomedical engineer in all company departments. Biomedical engineers are key and highly valuable employees for the business growth of companies in Latin America. This paper provides biomedical engineers an overview of the activities performed by a Chinese multinational, the challenges, important peculiarities of Latin American countries, and the skills and capabilities that a biomedical engineer must have to work for a Chinese multinational.

Keywords—*Biomedical engineer, Multinational, Technical service, Marketing, Business.*

SCENARIO

The Latin American (LA) market is of great interest for global multinational companies, especially for Asian companies that provide goods and services related to medical devices (MD) because of constant economic and technological development and day-to-day expansion of LA.[1,2]

To develop robust and lasting business and commercial partnerships in LA, multinationals hire for the region professionals with a multidisciplinary background, such as biomedical engineering. Biomedical engineering has multidisciplinary educational foundation, making it a profession with great emerging potential. It includes training in medical devices, hospital areas, and technical support, training, and advice on software development and programming, and commercial development, among other subjects, which make it attractive for multinationals.[3]

Hence, the role of a biomedical engineer has become fundamental in multinationals because of commercial globalization of medical devices between Asia (China) and LA.

Chinese multinationals are increasing the number of biomedical engineers in the region to expand their businesses. These professionals are the targets of recruitment,

with attractive and well-paid job offers that provide economic stability and best salaries.[4]

AREAS OF PRACTICE OF A BIOMEDICAL ENGINEER

A biomedical engineer has many areas of action, as described, when working in an Asian multinational (Figure 1).

***Technical Support*:** A biomedical engineer is responsible for providing support, advice, and technical training on medical devices to distributors of Asian multinationals (Figure 1).

A biomedical engineer, formally and in person, introduces the Chinese multinational to the companies they visit, explaining the multinational's history, certifications, potential clients, medical devices it manufactures, and its competitors, among other things. They also disseminate technological trends and their positioning in the international market regarding medical devices.

Training: Biomedical engineer provides training of medical devices manufactured by Asian multinationals to interested distributors. A training plan is developed to cover topics such as operations, functioning, installation, equipment start-up, technical issues, troubleshooting, applications, technical differences with competitors, and queries.

Marketing: Multinational companies have a marketing department, which also includes biomedical engineers. They constantly support and assist distributors in LA as well as staffs of hospitals and clinics public and private sectors.

Market Research: A biomedical engineer assists in acquiring new businesses in LA. This activity requires conducting a market study, which analyzes the portfolios, products, and devices distributed by companies in LA. This allows companies to identify whether they lack devices manufactured by Asian multinationals in their portfolios.

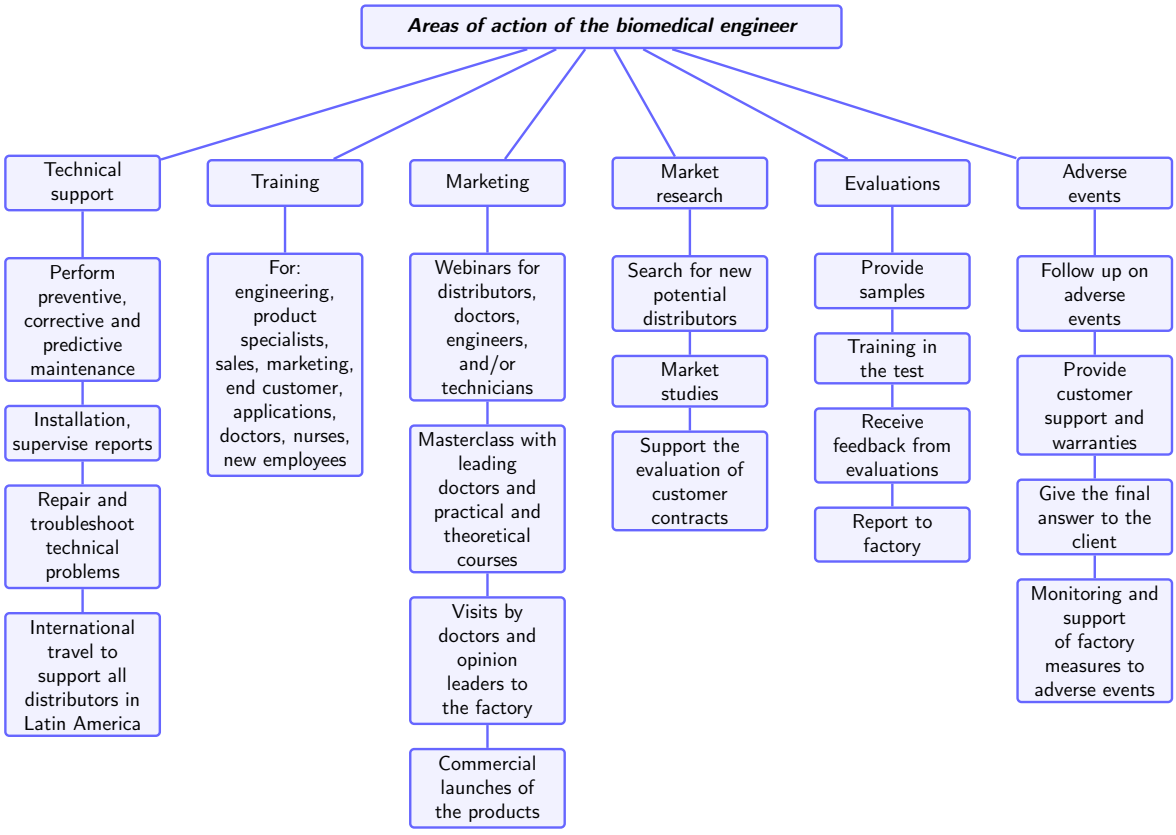

FIGURE 1. Areas of action of a biomedical engineer.

It is essential to conduct an in-depth and comprehensive market study of medical devices that have arrived in each country, including brands, models, prices, competitors, and other factors. LA companies must not have conflict of interest; a commercial strategy is developed to convince and justify the need to include the products offered in their portfolio.

Advantages over competitors must be demonstrated along with price comparisons in both public and private sectors as well as the market size in absolute numbers. Biomedical engineers assist and support this research so that Asian multinationals can identify their best distributors in each LA country.

Support for Potential Distributors: Biomedical engineers provide demonstrations of the medical devices manufactured by Asian multinationals. They provide all necessary support, so that the potential distributors can evaluate the medical devices and decide whether to distribute products in their country. Biomedical engineers provide samples, accompany them to the facility, provide training, and support and assist a physician or healthcare professional conducting the evaluation.

Adverse Event Management: Adverse events are the situations that compromise or affect life or health of the patients using the medical device.[5] In case users inform about an adverse event, then biomedical engineer provides the distributor a detailed report of adverse events, attaching photos, videos, and related information of the medical device, such as model, serial number, or lot. With this information, the manufacturer identifies the lot number and requests that the medical device be sent to China for evaluation, and gives a response to the distributor and/or hospital where the adverse event occurred.

BIOMEDICAL ENGINEER AS A PRODUCT SPECIALIST

To become a product specialist in an Asian multinational, a biomedical engineer must have a professional degree, a professional card, and the necessary country-specific permit to work with medical devices in hospitals and/or clinics.[6] They must also be qualified and possess the skills described below:

Experience with Medical Devices: A biomedical engineer must have experience in the operation and technical support of medical devices as well as experience of working in a hospital environment.

Authorization by the Manufacturer: A biomedical engineer must receive training at a manufacturer's location.[7] This multidisciplinary training involves several departments, such as service, technical support, marketing, product specialists, sales, vendors, commercial support, and human resources, among others.

Knowledge of Different Languages: Most Chinese multinationals have English-speaking staff in their international teams, so biomedical engineers must speak at least English. Knowledge and speaking of more languages expands job opportunities and enhances global management skills.

Speaking Spanish and Portuguese is a plus point to work in LA markets.

This allows for a direct communication between companies in LA and manufacturers in China.

Business and Negotiation skills: Biomedical engineers possess and develop commercial skills to promote medical devices manufactured by multinationals. Being professionals, they obtain information on market behavior from distributors. They must provide credibility to companies and gain the trust of investors.

Troubleshooting: Biomedical engineers must have quick and practical problem-solving skills. They maintain direct communication with factories in China for support, to provide information and support to distributors in a quick and professional manner.

Independent Work: Complete knowledge must be acquired promptly. Learn to work independently, develop quickly job responsibilities, schedule daily activities, and show the Chinese company significant results within a short term. All this to provide technical support required by distributors.

COMMERCIAL DIFFERENCES BETWEEN LA COUNTRIES

As observed in Tables 1 and 2, markets are very diverse in LA. They vary in area, population, GDP per capita, number of hospitals and beds, trade relations with China, and diverse economies. This diversity is LA's greatest asset that attracts the attention of multinationals globally.

TABLE 1. Differences in territorial extension, population, GDP per capita, and number of beds and hospitals in the countries of LA.[7–10]

Country	Territorial Extension (km^2)	Population 2023 (Millions)	GDP per Capita 2023 (USD)	Number of Hospitals (Beds)
Brazil	8,510,417,771	211.1	10,294,87	7,191 (427,097)
Argentina	2,780,000	46.65	14,187,48	5,012 (166,943)
Chile	756,626	19.66	17,067,81	425 (44,700)
Colombia	1,142,000	52.32	6,947,36	2,500 (79,000)
Perú	1,285,000	33.85	7,906,59	1,078 (35,981)
Ecuador	283,561	17.98	6,609,80	900 (24,802)
Venezuela	916,445	28.3	5,213	757 (16,300)
Uruguay	176,215	3.388	22,797,81	105 (9,505)
Bolivia	1,098,581	12.24	3,686,28	469 (17,000)
Paraguay	406,752	6.844	6,276,35	1,107 (10,200)

TABLE 2. Differences between markets in LA countries.[11–14]

Country	Health Registry	Trade Relations with China	Reuse of Disposable Medical Devices	National Tax (Average 2025)
Brazil	Yes	Yes	No	22.25%
Argentina	Yes	Yes	Yes	21%
Chile	No	Yes	No	9%
Colombia	Yes	Yes	Yes	19%
Perú	Yes	Yes	Yes	18%
Ecuador	Yes	Yes	Yes	12%
Venezuela	Yes	Yes	Yes	16%
Uruguay	Yes	Yes	No	10%
Bolivia	Yes	Yes	Yes	13%
Paraguay	Yes	No	Yes	10%

In terms of territory/land area, Brazil is the largest country in LA, followed by Argentina, with Paraguay being the smallest country.

In terms of population, Brazil is the most populated country among all representative countries of LA. Curiously, Colombia, which in territorial extension is number four, becomes the second most populated country in LA.

The country with the highest GDP per capita (USD) in 2023 was Chile, followed by Argentina and Brazil. These three are the richest countries in LA.

Regarding the number of hospitals and beds in LA countries, Brazil is at number one, followed by Argentina and Colombia.

To do medical business in LA countries, it's necessary to know whether health registration is required, what documents are needed, expenses, and the processing period. Chile is one of the countries where business can be started promptly because health registration is not required. However, Chile is a very demanding country with high quality standards, and any product is not accepted easily.

For disposable medical devices, it is important to know whether these countries reuse these devices or not because the sales volume depends on the volume of reuse. Brazil, Chile, and Uruguay are the only countries in LA that do not reuse disposable medical devices, so sales volume in these countries is high.

National tax in each country of LA is very important and must be taken into account when calculating the final price of manufactured products. High taxes impact the final price of products reaching the consumer. The strategy adopted by Chinese multinationals is to lower prices for importers in the countries with higher taxes in order to maintain competitive prices in the market. Table 2 shows that Brazil has the highest taxes. However, owing to a large population, all multinationals vie for market share and high sales volumes in Brazil. Many Chinese brands often fail to enter the Brazilian market because high taxes make product prices uncompetitive. Other countries with high taxes are Argentina and Colombia. Countries with the lowest taxes are Chile, Paraguay, and Uruguay.

Below-mentioned countries have a significant impact in medical devices market of LA.

Brazil: In Brazil, National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária, ANVISA) supervises and controls the marketing of medical devices. It is responsible for issuing health registrations and authorizing the distribution of medical devices.

In the case of Class III medical devices[15], ANVISA officials travel to China to thoroughly inspect the factories and warehouses of medical devices. In Brazil, manufacturers have to obtain the certificate of good practices to process the health registration of their medical devices.[16]

Brazil's market for disposables and consumables is 100% effective; there is no reuse because ANVISA imposes rigorous sanctions on healthcare institutions that do not use products as described in the instructions for use of medical devices. The Brazilian market is receptive and open to distribute medical devices from Asian companies. Trade agreements between Brazil and China facilitate this trade between the countries.[17]

Chile: Chile is a country that does not require health registration to import medical devices.[13] A free trade agreement between Chile and China facilitates trade between the countries.[18] The Chilean market does not reuse disposable consumables; clinics and hospitals have strict policies, do not accept reuse, and fully comply with manufacturers' recommendations.

Argentina: The government entity responsible for granting health registrations is the National Administration of Drugs, Food, and Medical Technology (Administración Nacional de Medicamentos, Alimentos y Tecnología Médica, ANMAT).[19] Asian multinationals must provide local companies in Argentina with a free sale certificate (for their protection) issued by a country with high health surveillance in medical technology, such as the European Union, the United States, Canada, Australia, Japan, and Israel.[20]

Paraguay and Bolivia: In both countries, documents are required to register medical devices and obtain health records to market medical devices. Paraguay has no commercial relationship with China[21], which makes the procedures longer. In Paraguay, the government entity in charge of carrying out health records is the National Directorate of Health Surveillance (Dirección Nacional de Vigilancia Sanitaria, DINAVISA)[22], while in Bolivia it is the State Agency for Medicines and Health Technologies (Agencia Estatal de Medicamentos y Tecnologías en Salud, AGEMED).[13]

Uruguay: The health registration of medical devices must be processed at the Information Transfer Platform for the registration of medical products (PIRM), which is controlled by the Ministry of Public Health (Ministerio de Salud Pública, MSP).[13] In this case, there is a market leak from Uruguay because of its proximity to Argentina, because many people travel to Argentina to undergo medical procedures because of affordability.

Peru and Colombia: The government entity that accomplishes health registrations of medical devices in Colombia is the National Institute for Drug and Food Surveillance (Instituto Nacional de Vigilancia de Medicamentos y Alimentos, INVIMA)[23], while in Peru it is the General Directorate of Medicines, Supplies and Drugs (Dirección General de Medicamentos, Insumos y Drogas, DIGEMID).[13] New manufacturers are constantly entering the markets of these countries because of considerable potential to develop new distributors.

Ecuador: The health registration of medical devices is accomplished by the National Agency for Health Regulation, Control and Surveillance (Agencia Nacional de Regulación, Control y Vigilancia Sanitaria, ARCSA).[13] The official currency is US dollar, and Ecuadorian businesspeople can conduct commercial transactions with China using their currency.

The LA countries are experiencing constant economic growth and have enormous potential to develop new businesses and markets for Chinese multinationals. China boasts cutting-edge technology with competitive prices. LA has a significant market for Asian medical technologies.

CHALLENGES OF WORKING IN A CHINESE MULTINATIONAL

A biomedical engineer confronts many job challenges for working in an Asian multinational, which are as follows.

Cultural Differences: Asian culture and anticipations are quite different from LA culture. It is advisable to maintain good communication with Chinese employees, and share everything and listen to their perspective.

Working Hours: In China, employees are expected to work 24 hours daily. They must always be willing and able to work directly in factories. Owing to the time difference, they must be willing to have work meetings at night.

Documentation: Asian manufacturers have high standards for the services and documents they issue to clients. Therefore, it is important to have proficiency in English writing and presentation of reports (weekly, biweekly, monthly, quarterly, semiannual, and annual).

Language: Language is often a limitation. Asian multinationals always hire English-speaking employees, but

it is a Chinese-based English that employees of these multinationals must adapt to and become familiar with.

Most countries in LA speak Spanish, so it's important to speak and write Spanish. Portuguese is spoken in Brazil. Having knowledge of these three languages allows to work effectively in LA, including several Caribbean islands that have their own dialects but understand English.

Departmental Interrelations Within the Company: One must interact frequently with many departments, so learning to work in multidisciplinary teams is important. Therefore, a biomedical engineer must achieve this professional profile.

Business Trips: International travel is ongoing. A US visa is required because most medical device exhibitions are international, and LA businesspeople often attend to close deals and do business with multinational companies. A Chinese visa is also required for factory training, certification, and in-person meetings at the end of the year.

AUTHOR'S WORK EXPERIENCE IN CHINESE MULTINATIONALS

Specialist Engineer (2018–2020): The author represented the entire product line of Medcaptain Medical Technology (www.medcaptain.com) located in Shenzhen, Guangdong, China.

The author was responsible for the southern LA countries (Brazil, Chile, Argentina, Uruguay, Bolivia, and Paraguay). The following products were covered:

- Infusion workstation
- Infusion pump
- Enteral infusion pump
- MRI infusion pump console
- Video laryngoscope
- Portable oxygen
- Vein viewer
- Immunoassays
- Thromboelastography (TEG)
- Real-time PCR (RT-PCR)
- RT-PCR kits
- Blood typing

International Sales Manager (2020–2022): The author worked with in vitro diagnostic (IVD) products at Medcaptain Medical Technology. He developed business throughout LA in the company's IVD clinical laboratory line.

LatAm Regional Manager (2023–2024): The author expanded business in LA for Fulbright Medical Inc. (https://www.fulbrightmed.com). He was responsible for Chile, Peru, Argentina, Bolivia, Uruguay, and Paraguay markets. Fulbright Medical Inc. specializes in manual and motorized surgical staplers, with a wide range of staplers on different platforms.

Regional Manager Latin America (2025–Present): At Hocer (Tianjin) Medical Technologies Co. (http://en.hocermed.com/), located in Tianjin, China, the author is responsible for opening business avenues throughout LA and Central America. Hocer Medical Technologies specializes in high-tech ultrasonic scalpels used for surgical procedures.

CONCLUSIONS

The hiring of biomedical engineers by Asian multinationals is constantly growing in LA markets; hence, it is important to be prepared and have necessary skills to fill these positions. Biomedical engineers are fundamental employees for these companies, providing LA professionals with job stability and the opportunity to work globally.

Chinese have arrived to revolutionize the field of medical technology and are here to stay because of competitive prices, cutting-edge competition, high-quality technology, easy operation, and many other applications that make daily life easier for healthcare professionals.

Biomedical engineers are valuable to LA businesspeople who want to do business with Chinese multinationals. Because biomedical engineers are the intermediaries between LA businesses and China, LA businesspeople greatly value being served by a Spanish speaker from their region.

Biomedical engineers need a well-rounded education, with fluency in spoken and written languages; a coursework in marketing and business is essential. LA is looking for leaders and professionals in this rapidly growing field.

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AUTHOR CONTRIBUTIONS

Conceptualization, Methodology, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Project administration, Funding acquisition: D.R.A. The author read and approved the final manuscript.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

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FURTHER DISCLOSURE

Not applicable.

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