PROPESCT OF INDONESIA’S CONSTRUCTION STEEL DEVELOPMENT AND MARKET

Basso D. Makahanap
Standardization, Certification & Law Enforcement Director

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I. Introduction

Indonesia consist of 34 provinces with population about 270 million people. Those people are not distributed properly, The highest people density is found in Jakarta with 15,478 people/km$^2$ and the lowest is found in Papua with 9 people/km$^2$.

The characteristic of building or housing in the high or very high people density area is different. In Jakarta 393 building with higher than 12 floor were built compare to Papua 1 and Kalimantan Utara 0 building. The high rise building need stronger and more tough construction steel properties compare to the ordinary one. The building height is increasing. Some new grade is required in order to fulfill the construction of those higher building. Indonesia's population increase yearly, additional houses are required. In line with this condition construction steel demand will be increased.

Indonesia’s GDP and its population increase yearly. On the other side, Indonesia’s government is very active to build infrastructure facilities order to improve the interconnection in the whole country. Stable GDP increase, high urbanization rate and very active infrastructure development are boost up demand of housings and others social facilities. Increasing demands of those facilities means increasing the steel market since to build those facilities steel is needed.

Indonesia also located in one of the most seismic active area in the world. Several big earth quake occurred in the recent years with the magnitude above 6, this big earth quake caused a big loss of life and properties. Construction steel for the high seismic activity should have stronger earth quake resistance, this is the prospect for developing a high earth quake resistant steel.

It is can be said that construction steel market in Indonesia has a bright prospect but should be considered about the people density and seismic character of each area. The steel specification and market volume will be different for the high people density area compare to the lower one, also for active seismic area and area low seismic activity.
II. Indonesia’s Steel Industry Key Driver
### Backward-Forward Linkage of Indonesia’s Steel Industry

<table>
<thead>
<tr>
<th>Sector</th>
<th>Backward Linkage</th>
<th>Forward Linkage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Industry</td>
<td>2.383 (Rank – 3)</td>
<td>2.345 (Rank-11)</td>
</tr>
</tbody>
</table>

**Figure 1, Indonesia’s Steel Backward and Forward Linkage**

*Forward linkage* industri factor of steel industry is high enough (2.345). Steel industry is the backbone of the other industry including infrastructure and construction industry since the main raw material of those industry is steel.

Source: kajian FEB UGM 2015
Construction industry has a significant contribution to Indonesia’s GDP. The contribution from 2011 up to 2017 is increased yearly with the figure 9.4 % up to 10%.

Figure 2, Construction Industry to Indonesia’s GDP
One of Indonesia’s forward linkage factor is construction industry.

Indonesia market is mostly for construction sector. The construction industry in Indonesia is driven by:

- Increasing demand of housing, offices and other facilities due to increasing of the population and GDP/capita;
- Infrastructure project like toll roads, harbors, dam and other facilities driven by the Government.

It is clear that the key driver of Indonesia’s steel industry is construction industry.

Source: Ministry of Public Works And Human Settlement
III. Main Prospect Factors of Indonesia’s Steel Market and Development

1. Demographic condition
2. Gross Domestic Product (GDP)
3. Seismic Characteristic
Indonesia’s population is not distributed properly. The gap between the highest populated island compare to the lowest populated island, is very big as shown in Figure 4.

As a result of this unbalance population distribution, the economic activities is concentrated in Java, Java’s contribution to Indonesia’s PDB is higher compare to the other islands. Higher people density and economic activities means higher demands for economic, offices, business and other social facilities. One of the ways to fulfill those requirements is to build high rise buildings due to limited area and higher land price.
The people distribution is correlated with building construction characteristic. The high rise buildings are concentrated in Java and Sumatera island, the highest populated island in Indonesia.

In the area where the people density is low like in Kalimantan, Papua, Sulawesi ordinary housing and building seems the right solution to fulfill those housing and other facilities requirement since the land is not a problem.

The construction steel market in Indonesia naturally follow the people distribution characteristic. In the high people concentration area where the high rise buildings are required, using of the high strength and high toughness steel is a mandatory. In the low people concentration area where the ordinary buildings are required, ordinary steel is enough.

It is can be said that the people distribution has an indirect correlation with construction steel specification.
Urbanization in Indonesia is increase yearly as shown in Figure 6. The urban population is concentrated in main big cities especially Jakarta, Surabaya and Bandung as shown in Figure 7. Increasing urban population means increasing incomes and traffic. It means that demand for housing, office space, shopping space, hotels and health facility like hospitals will be increased. High rise buildings are to be built in order to fulfill those requirement due to limit space of the land.

The construction steel specification indirectly influenced by the urbanization trend, higher urbanization will boost more and higher height of the high rise buildings population. It means stronger and more toughness construction steel is required, this is the chance to develop construction steel specification.
III. Main Prospect Factors of Indonesia’s Steel Market and Development

1. Demographic condition
2. Gross Domestic Product (GDP)
3. Seismic Characteristic
Gross Domestic Product (GDP) of each country usually has strong correlation with steel consumption. Indonesia’s steel consumption trend is inline with GDP trend.

The main product of Indonesia’s steel is construction steel. In the future, Indonesia’s GDP trends is to be increased, and it will boost the construction steel demand or market, it means that the construction steel market will be increased in line with increasing of GDP.

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**Figure 8, Correlation between Indonesia’s GDP and Steel Consumption**
Increasing of GDP and population will boost the ordinary building and housing requirement especially in the area with low people density.

The main component of construction steel for the ordinary building and housing are rebar for construction and coated steel for roofing. The consumption trend of rebar and coated steel are increased yearly as shown in Figure 9 and Figure 10. This trend is in line with steel consumption trend due to increasing of GDP. Increasing of GDP and population will be followed by increasing of rebar and coated steel for ordinary housing, it’s means the market for those steel will be grown up bigger and bigger.
III. Main Prospect Factors of Indonesia’s Steel Market and Development

1. Demographic condition
2. Gross Domestic Product (GDP)
3. Seismic Characteristic
Some part of Indonesia is located in the high risk earthquake area.

High earthquake risk areas are the western part of Sumatera, southern part of Java, Bali and Nusa Tenggara, northern part of Papua, southern part of Maluku, central and north part of Sulawesi.

Figure 11, Indonesia’s Earth Quake Risk Map

Source: geospasial.bnpb.go.id
Earthquake historical data from year 1833 – 2018 with 6.3 – 9.3 Magnitude is shown in Figure 11. The big earthquake (6.3 – 9.3 M) occurred in the high earthquake risk area and majority occurred in western part of Sumatera. Some of those earthquakes followed by tsunami, like in Aceh (9.1 M) on 26th December 2004 and Palu (7.4 M) on 29th September 2018.

The last earthquake occurred in Lombok Island (6.4 M) and Palu (7.4 M), a lot of building, housing, and other facilities were collapsed. So much ordinary building and housing were collapsed. One of the reasons maybe the construction steel used was not the earthquake resistance steel. So, in future the ordinary housing and building in the high earthquake risk area should be built with earthquake resistance steel. It's mean that development of construction steel for ordinary building and housing in high earthquake risk area is required in terms of specification and commercial aspects.
The last Indonesia’s iconic construction designed with earth quake resistant design is Garuda Wisnu Kencana statue in Denpasar, Bali. This statue is one of the highest statue in the world and just inaugurated in the last August. This statue is designed to anticipate the earth quake up to 8 M, its height is 121 m, 68 m width and the weight is 3000 tons.
## Construction Steel Grade Can Be Produced in Indonesia

Several construction steel can be produced in Indonesia, among others are:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>JIS G 3101 SS 400, SS 490, SS 540</td>
<td>for structural steel application</td>
</tr>
<tr>
<td>JIS G 3106 SM 400A, B, C, SM490YA, YB, SM520B, C, SM570</td>
<td>for superior strength and weldability structure</td>
</tr>
<tr>
<td>JIS G 3136 SN 400A, B, C, SN 490A, B, C</td>
<td>for square pipe application</td>
</tr>
<tr>
<td>DIN 17100 St 37, St 44, St 50, St 52</td>
<td>for structural steel application</td>
</tr>
<tr>
<td>BS 4360 43A, B, C, 50A, B, C</td>
<td>for structural steel application</td>
</tr>
<tr>
<td>ASTM A570 Gr. 30, 33, 36, 40, 45, 50</td>
<td>for structural steel application</td>
</tr>
<tr>
<td>BSEN 10025 S 275 (J0, JR, J2), S 355 (J0, JR, J2)</td>
<td>for welded structure application</td>
</tr>
<tr>
<td>DIN 17175 15Mo3</td>
<td>for fire resistant steel</td>
</tr>
<tr>
<td>AS 1594-1992 HA 200, HA 250, HA 300, HA 350</td>
<td>General Structures for Building, Bridge, Ships</td>
</tr>
<tr>
<td>AS/NZ 1594 – 2002 HA 250, HA 350</td>
<td>General Structures for Building, Bridge, Ships</td>
</tr>
<tr>
<td>ASTM A 36</td>
<td>Carbon steel for structural quality for use welded construction of bridges and building and general structural purpose</td>
</tr>
<tr>
<td>ASTM A 242 GR 2</td>
<td>High Strength Low Alloy Structural Steel</td>
</tr>
<tr>
<td>ASTM A 572 GR 42, GR 50, GR 55</td>
<td>High strength low alloy columbium, vanadium structural steel</td>
</tr>
<tr>
<td>SNI 2052: 2011</td>
<td>H-beam section</td>
</tr>
<tr>
<td>SNI 07-0329-2006 I</td>
<td>Beam section</td>
</tr>
<tr>
<td>SNI 07-0052-2006 U</td>
<td>U Channel section</td>
</tr>
<tr>
<td>SNI 07-2054-2006</td>
<td>Equal angle section</td>
</tr>
<tr>
<td>SNI 07-7178 2006</td>
<td>Wide Flange beam section</td>
</tr>
<tr>
<td>SNI 2610: 2011</td>
<td>H-beam section</td>
</tr>
<tr>
<td>Etc.</td>
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</tbody>
</table>
Development of construction steel market in Indonesia determined by three main factors:

1. **Demographic conditions**
   - ✔ Indonesia’s population increased yearly, housing, commercial and other social facilities is needed. To build those facilities construction steel is required, so the construction steel market will be grown up in line with increasing of the population.
   - ✔ The population gap between the highest and the lowest population density is very high, the highest population density is 15,478 people/km$^2$ and the lowest 442 people /km$^2$ , it is caused the construction of housing and other living facilities is different. The high people density area need high rise building due to limitation of the land, means the higher strength construction steel is required, the low people density need ordinary housing and building means the ordinary steel is enough for those building.

2. **Gross Domestic Product (GDP)**
   - Indonesia’s GDP tends to increase every year. The steel consumption also tends to increase in line with the increasing of GDP. The higher the GDP, the higher the construction steel requirement, its means that the construction steel market will be increased too.

3. **Seismic condition**
   - Some parts of Indonesia are located in the high earth quake risk area. The last earth quake occurred in Lombok island and Palu (central Sulawesi), a lot of housing and ordinary building collapsed. It means that development of earth quake resistance construction steel specification is required not only for high rise building but also for ordinary building and housing.
TERIMA KASIH