

Future potentiality of the large tile for the tile construction

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Abstract: Construction tile market in Japan is decreasing by 77% compared to its peak in shipment due to accidents of detachment and falling and the rise of construction costs. Factors of detachment and falling are not only by the earthquake but “differential movement” and that there seems to be a limit of today’s constructions methods. Furthermore, the responsibility of detachment and falling are dealt as a contractor’s warranty against defects, which leads to the cessation of tile craftsman’s business.

On the other hand, overhaul of construction methods are required to be modified because of from the submission of “technical argument” to accuse the responsibility to general contractor at the trial over the responsibility of detachment and falling. As for countries of Southeast Asia, the revision of tile constructing is required due to the accident of detachment and falling and overlap of repairing period of superannuated high-story buildings.

This report verifies effects and issues of promoting large tiles and these construction methods as an examination to tile market’s sustainability.

Key Words: large tile, GACHI LOCK, differential movement and technical argument

1 Introduction

Finishing materials for interior and exterior, such as tiles and building stones, are being used and give townscape a solemn impression inside and outside Japan.

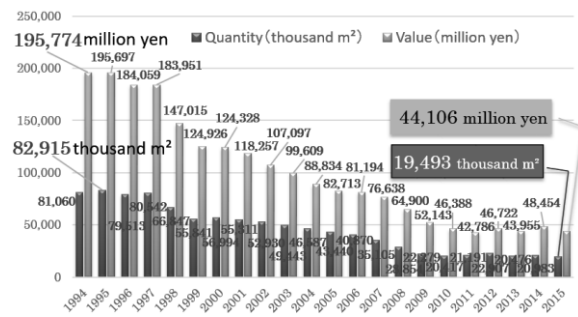


Fig. 1 Statistics of tile production and shipment.

Source: “Yearbook of Current Production Statistics” by Ministry of Economy, Trade and Industry

On the other hand, tile’s shipment on 2015 decreased

about 75.6% comparing it to its peak period on 1995, because the demand of a cutback in the budget has taken root as a global economic trend, and also by the tile’s problem of falling and detachment from differential movement[1] and the earthquake[2] (shown Fig. 1) .

Due to the spread of curtain wall, diversity of exterior materials and the usage of new materials such as glass, are also the factor of the decrease of tile shipment.

Meanwhile, under the circumstances of severe construction cost, high-rise building requires to use tiles, building stone and glass to raise its asset value which leads labor cost down and shortage.

In Japan, blue-collar workers are decreasing along with the decline of working age population. Among the blue-collar workers, many of them are changing to be painters and steep jacks that are proceeding technical innovation and systematization of method of construction.

Outside Japan, along with the rise of labor costs, the

awareness of safety from earthquake and aging calls for technical innovation of “material” and “method of construction” while reflecting its containment of construction costs.

This report examines tile industry’s sustainability by looking at the common issue of tile’s falling and detachment and high need of “large tile” at exhibition in and outside of Japan nonetheless of the market size.

2 Tile industry’s history and its current situation

2.1 Movement of tile industry in Japan

Interior and exterior of high-rise buildings in Japan have been using around 45mm×95mm mosaic tile. Therefore, there is no manufacturer that owns equipment for producing large tile over 300mm×300mm. Furthermore, current tile industry’s situation are in chaos, a major tile manufacturer, INAX Inc. (currently LIXIL Co., Ltd.) is reducing its production by the decrease of a market size. There is a problem of tile falling and detachment to solve as well.

A large number of accident of falling exterior wall have been reported in Japan such as the accident on November 1989 at Kitakyushu, Fukuoka where three pedestrians were killed or injured by the detachment of tile exterior wall of ten stories building of housing and city maintenance’s public corporation. Also including the accident of falling tile wall exterior at Kayabacho, Tokyo on June 2005 where two people were seriously injured.

The Ministry of Land, Infrastructure, Transport and Tourism has conducted an urgent survey of tile’s exterior diagonal wall that were completed over ten years ago and are located in city center. From that survey, 924 out of 11,013 cases were judged “risk of falling” and carried out guidance to take falling prevention measures. Furthermore, the ministry opened the cause of detachment and falling to public in Building construction supervision guidelines 2007 version [3].

According to that Building construction supervision guidelines Building construction supervision guidelines 2007 version, the biggest cause of detachment of exterior wall is from plasterer’s interface detachment between “frame concrete” and “mortar bed” by 74% [3] (shown Fig. 2) .

Meanwhile, pursuing the liability of tile contractor is endlessly happening by only taking up surface happening of “tile falling down”, although the detachment caused at the joint between Sticking mortar and “exterior” accounts for only 26% (shown Fig. 2) .

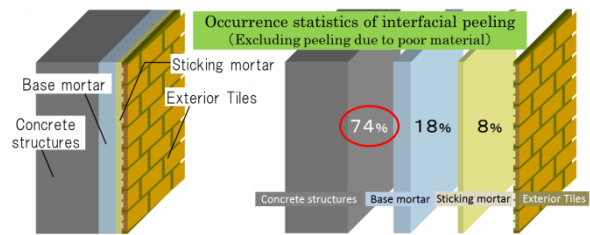


Fig. 2 Occurrence statistics of interfacial peeling
Source: “Building construction supervision guidelines 2007 version” by Ministry of Land, Infrastructure, Transport and Tourism

Due to this, the tile industry including the general contractor have been developing measures against tile detachment for example, “LOOP BOND / TOUGH BINDER method”, which was publicized in “Building construction supervision guidelines 2007 version” [3] and “GACHI LOCK”, “DF method” and “SG method” for large tile construction method. Also, efforts have been made as an industry to prevent the tile detachment. As a part of this, the industry has founded and promoted “Quality accreditation system for Combination of organic Adhesive and exterior Tile: Q-CAT” on April 2014 to promote Paste with adhesive and improve construction quality.

Furthermore, presentation of epoch-making “technical argument” caught attention throughout the industry when the general contractor demanded compensation for damage of the tile falling accident at the constructed apartment building to the tile contractor at the trial. Therefore, it was common to reach compromise in a form that contractors give up because of their relation. On the contrary, “technical argument” states differential movement between tile’s contraction and frame concrete from the solar radiation, not because not by the skill of craftsperson.

On the whole, it became clear that avoidance of falling and detachment by conventional method of construction is difficult.

When focusing on tile manufacturer’s sales promotion, trend of “large tile” is getting trendy for instance the booth of major company TOTO LTD at “ARCHITECTURE + CONSTRUCTION MATERIALS 2017” emphasizing 300cm×100cm tile in Japan.

2.2 Movement of tile industry outside Japan

According to JETRO’s “Developing emerging markets for Italy production - Sassuolo ceramic tile industry” [4], market size is incomparably bigger than

those of Japan. China, the no.1 country of production, has 757million and shipment 2015 which is 382.4 times bigger than Japan's shipment of 1,981[4] (shown Table 1) .

Table 1 Share in global market (2010)

国名	企業数 (社)	従業員 (名)	生産量 (100万㎡)	販売量 (100万㎡)		売上高 (100万ドル)		輸入量 (100万㎡)	1人当り 消費量 (㎡)
				国内	輸出	国内	輸出		
イタリア	172	23,352	387	123.6	289.2	1,612	4,525	21.2	2.5
中国	1,597	389,512	7,576	6,708	867.2	35,060	3,851	5.1	5.0
スペイン	176	16,200	366	133	247.6	1,062	2,316	11.6	3.1
アラブ 首長国連邦	4	15,000	90	25	65	180	450	48.0	21.0
ドイツ	24	4,424	50	25.1	24.9	214.1	401.7	89.6	1.4
ポルトガル	—	4,304	58	25.2	31.1	224.5	322.3	54.2	—
メキシコ	10	11,105	204	152.8	57	863	278	15.5	1.5
ウクライナ	8	520	52	69	21	48.3	83	—	1.5
ブラジル	94	23,500	753.5	699.6	57.2	—	—	—	3.8
日本	70	5,880	21	18	2	487	40	12.0	0.2
USA	16	—	—	60.3	3.9	858.9	39.7	129.6	0.6

Source:“Developing emerging markets for Italy production - Sassuolo ceramic tile industry“ by JETRO

The needs and the global trend of “large tile” can also be seen from the exhibition of 300cm×100cm and 500cm×300cm tiles when inspecting the 2015 and 2016 “TaiPei Building Show”.

However, there were no exhibition on large tile’s construction method. This may means, it could be spectated that there isn’t much progress on the standardization of construction method.

3 Industry’s sustainability issue

3.1 Perspective from technological strength

The stagnation of technological strength innovation is caused by the manufacture’s R&D department.

Japanese tile industry consists from major company LIXIL, TOTO and DANTO on the top of the list, share 83.5% of mosaic tile’s shipment at an industrial clusters in Mino area, Gifu Prefecture[5] .

Until merger of LIXIL and INAX in April 2011, the industry was formatted by INAX developing new products and smaller companies follow. Because market size was greatly falling before the merger, the R&D division was contracted and small companies did not have R&D division. As for large tiles over 300mm×300mm, globally popular, that Japanese manufacturers have no production equipment, it have no choice but to rely on importation, which becomes a bottleneck of sales promotion.

3.2 Perspective from personal

The issue from the personal perspective is the lack of number of mason and their training.

While mason needs at least five years of training, there are no applicant for apprentice the reason is the hourly pay as much as the part-time job at the convenience store due to the drop of unit price of specialist workers. Contractor and foreman who could pay for their crafts person decreased sharply which made it ranked in the higher place on the list of kinds of construction which are likely to be vanished in the future.

Tile should be evaluated by the whole process of tile construction not by tile itself only but also from manufacturing to shipping. On the contrary, from the accident of tile falling and detachment happened before, tile manufacturers consider that their responsibility are up to shipment and they are not focusing until constructing. It is pointed out that manufacturers’ contribution toward the issue of decreasing mason is low.

3.3 Perspective from sell strategy

The issue of selling strategy is taking root of styles only limited to selling activities specialized on design.

Although tile has prosperity of endurance and maintenance, the main adoption factor is based on its design. Consequently, it is natural to emphasize design on their selling promotion strategy.

However, there are risk of detachment and falling with the past construction method and we cannot say it provides “security and safety”.

In the current situation of in and outside of Japan, large tiles are sold without definite testimony because construction method has not yet established.

4 Direction of solution

There are three effective approach for the three aspects. To develop product and construction method with tile construction company, to raise selling rates of large tile and to import large tiles while exporting its construction methods.

Completion is getting harder for survival while market size is shrinking. It is understandable that increase of research and development investment is unrealistic. However it is also true that the risk of not having technical innovation and improvement can be serious. Therefore, not only its own research and development, business tie-up between manufacturers with effective technique and idea should be promoted.

Considering that contract has been completed at the time of a construction, cooperative research and development with an emphasis on the view of

construction site is absolutely effective for the improvement of quality.

Because large tile has added value and has larger demand from the perspective of design, aesthetic, developing method exceeded in workability it can make turn reduction of construction period, decrease risk of detachment and falling and raise wage of mason into reality.

In Japan, there is no standardized construction method although there some large tile construction methods by several companies. Currently, “GACHI LOCK” which MITOMO limited company developed and operated 30 tile companies in Tagimi area is a key effort to sustainability (shown Fig. 3) .

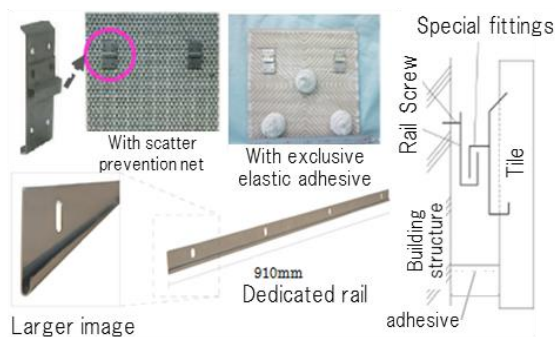


Fig. 3 “GACHI LOCK” method

Source: Product brochure by MITOMO limited company

“GACHI LOCK” is a construction method made by construction company of MITOMO limited company with taking mason’s opinion and efficiency at construction site into consideration. This method enables to construct “whoever” and “easily” and avoid the risk of detachment and falling utmost. Also it is ideal that tile manufacturer Tagimi area, tile’s industrial cluster and trading company established the promoting system together and are creating innovation, even they don’t have their own individual R&D department.

Furthermore, “GACHI LOCK” is a business model that was developed with the aspects of the earthquake, Japanese technological strength and open innovation, and can be effectively functioned outside Japan with increase escalation consciousness which should be tied up with international manufactures.

5 Conclusion

The tile industry has a character of comparatively slow technical innovation and business process development due to its small industry size compared to other

construction industries. This characteristic leads stagnated position of market size and craftsperson influx to paint industry and scaffolding industry.

Open innovation oriented development and sales promotion of large tile is also needed under these circumstances.

Therefore, industry structure with absence of leader should be reformed as the largest company INAX (now LIXIL) led the industry in R&D and now reduced.

The coming issue is mindset changing for open innovation and global operation. It can be considered the industry sustainability directly.

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Biography

Isao Okada is a Registered Management Consultant and works for the Credo Partner as a sole proprietor. He received a Miyagi prefecture, born 1970, graduate school of innovation management Hosei University graduated IM major, representative of Credo partner.

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