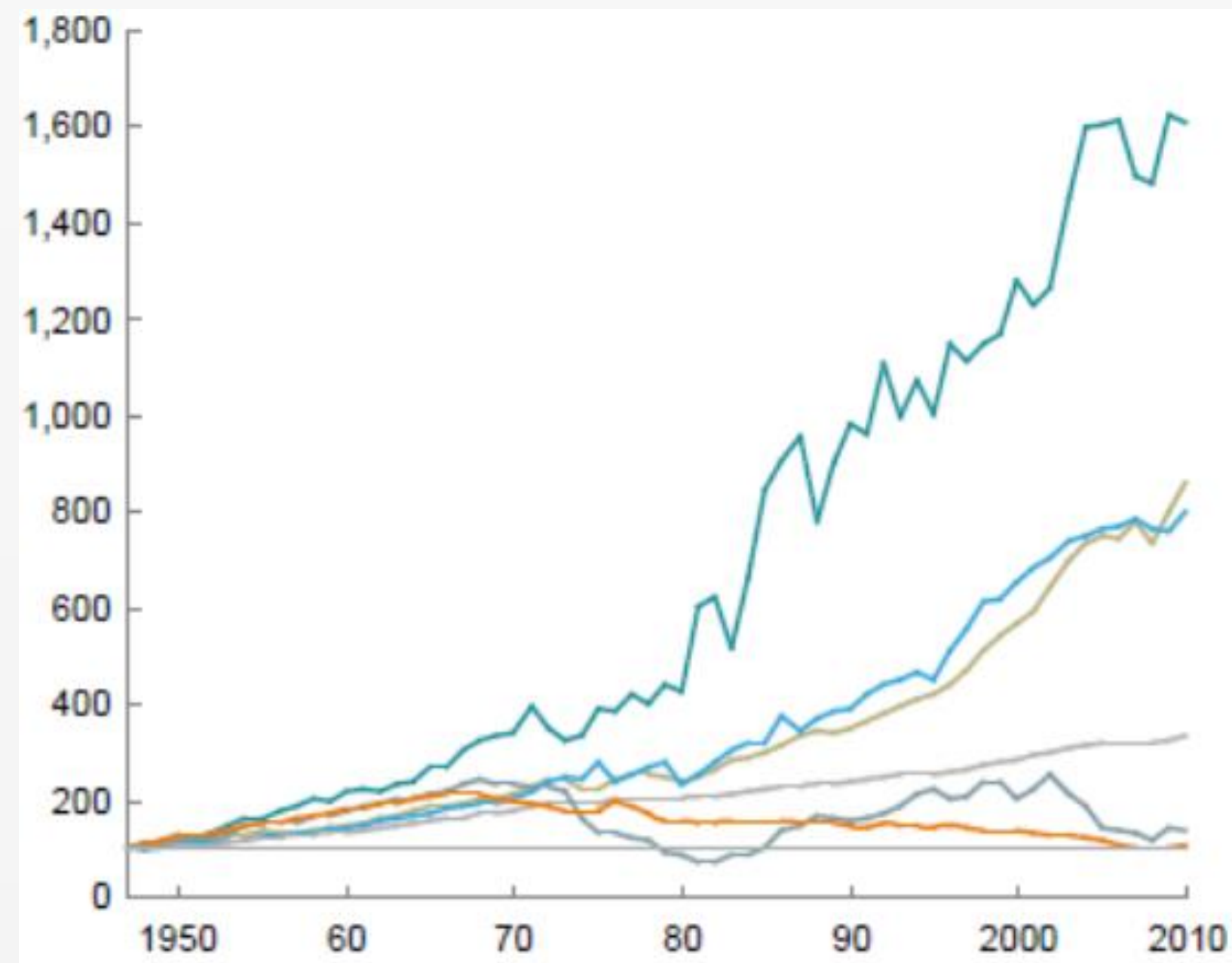


Volumetric Modules for Mixed-Use Buildings: Logan at 51st A Case Study

Significance of Modular Construction

The benefits of modular construction when optimized can deliver reduced build costs, overall lifetime costs, accelerated build schedules, greater certainty on build times and costs, improved quality, increased energy efficiency, and seismic performance. As the construction industry becomes less productive as shown below the need for modular construction becomes increasingly popular.



| Industry | Compound annual growth rate, 1947-2010 % | Total change |
|----------------------|--|--------------|
| Agriculture | 4.5 | 16.1x |
| Manufacturing | 3.5 | 8.6x |
| Wholesale and retail | 3.4 | 8.0x |
| Overall economy | 1.9 | 3.3x |
| Mining | 0.5 | 1.4x |
| Construction | 0.1 | 1.1x |

Modular construction has been a building technique since the 16th century and has since been refined into one of today's leading construction approaches. Modular construction is the process of manufacturing buildings or structures off-site. Modular construction is split into panelized systems which are two-dimensional system or volumetric system which are three-dimensional. This paper will examine the largest volumetric modular project, The Logan at 51st, in the Bay Area which is set to be complete by the end of 2020. This paper will outline the current modular construction trend; the different types of modular construction; the process that led to the selection of modular construction; the project specifics; the benefits of building using steel modules; the challenges encountered on site; the challenges faced off-site; the lessons learned; and recommendations for future modular projects. The project encountered many unique challenges due to the geographic location, the political environment of the Bay Area, and the combination of site built and off-site components. Even though there were many shortcomings of the project it proved to be a successful project and provided a lot of insightful information that can be useful for modular projects in the future.

Key Words: Modular Construction, Mixed use, Steel Modules, Collaboration, Volumetric

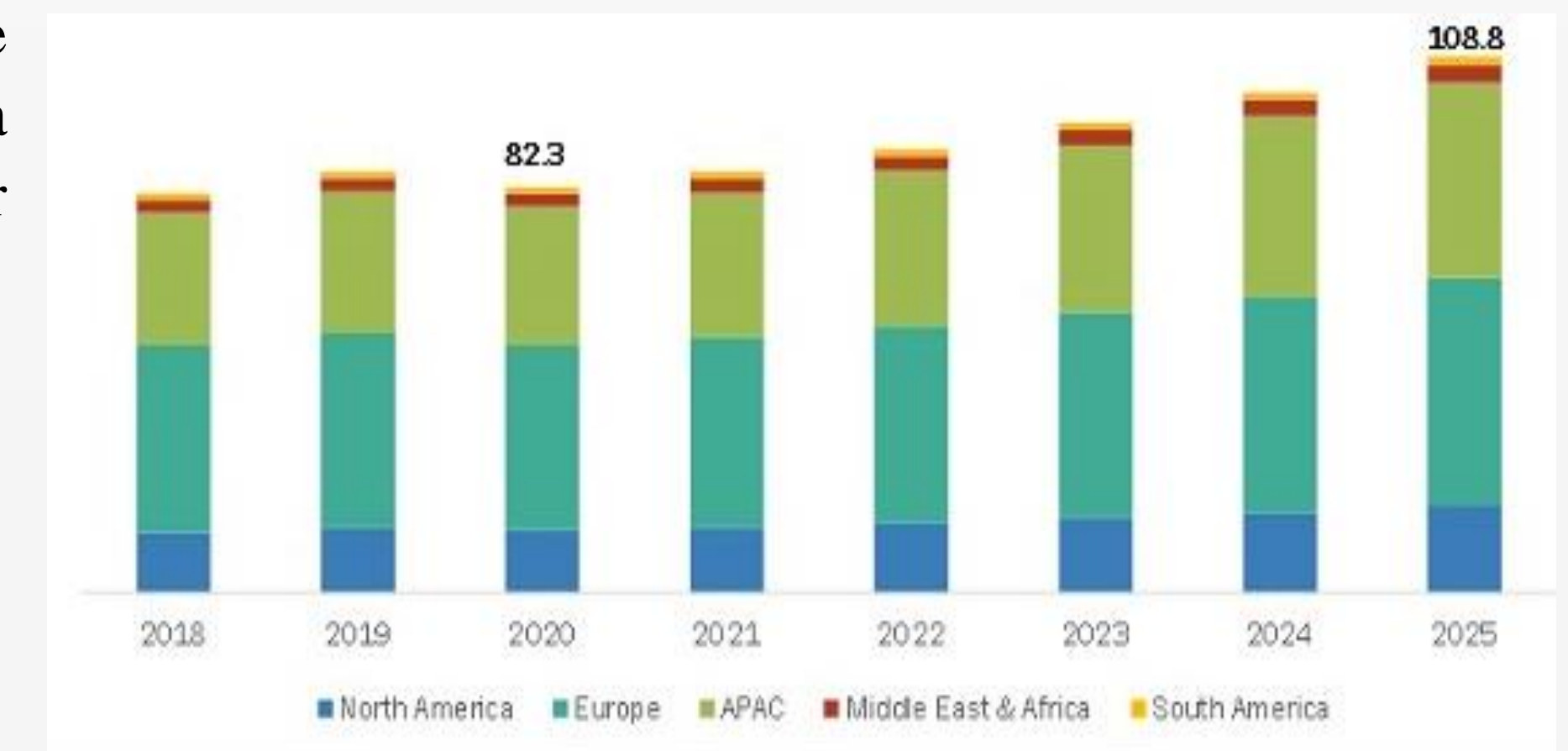


RAD BLOC

1. The four-sided module eliminates the redundancy in most traditional modular development. This reduction in redundancy also allows for taller interior space and more rentable square footage making the units more attractive for the tenant making.
2. Having steel framed modules allow for more accurate production and a reduction in waste. These factors lead to cheaper production costs, more sustainability.
3. The RADBLOC was designed to fit on the back of the trailer like a normal trailer which reduced the transportation costs and logistic planning.
4. The steel modules allowed for more design flexibility because of the structural integrity which made developing on irregular lots possible.

Research Impact

This case study has found that there are many benefits to building modularly if done properly and even though the site was a challenge the project was still able to live up to the expectations as the project team got more familiar with the project. California is currently in massive housing crisis and the modular building method is highly effective when it comes to creating something with repetitive components like an apartment complex. As more capital is invested in housing and manufacturing plants and municipalities get more exposure, the system will become more efficient from both a time and cost perspective. This case study also shows that safety and sustainability are improved using this method which will also play a bigger role in projects as the intangibles become more valuable.



Conclusions

As RAD Urbans largest modular project the Logan at 51st provided a lot of information in regards to system inefficiencies. As labor continues to be a problem and construction productivity continues to decrease, many urban areas throughout the country will need to adopt something new. Modular building techniques have been around for a long time but the demand for an alternative way to build has never been higher. Many developers are considering building modularly as a way to save money on labor costs and there are many modular manufacturers around the country so this may seem like a viable solution to this ever-growing problem

Methodology

The methodology chosen for this project was primarily qualitative. The qualitative study was done through interviews with members from different departments within RAD Urban, other developers that have explored building modularly, and key subcontractors that were hired to work on-site. The interviews were focused around how building modularly has been beneficial and how it has affected there scope. The interviews were also focused on how the conceptual benefits and challenges translate to reality

