MAN news

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IN FOCUS

Lean Construction **The MAN Way**


resolve
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team
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resolve

Lean Construction
The MAN Way

"I am impressed with what you have accomplished in terms of Lean implementation. This is a huge differentiator and will surely take you to the next level."

F.H - AUB Professor

"The latest innovations and implementations that you are working on will make you the leaders in Lebanon and the region, and at the level of the top 1% of construction companies in the US."

M.A - Arizona State University Professor and Data Scientist

"We are glad to see how MAN is continuously improving, and we will support them whenever needed."

B.M - Owner Representative

"This new system ensures proper and continual communication between all project team members, and therefore, improves teamwork. It also increases visibility – all project information that is difficult to capture in one person's mind is now available through this system."

W.C - Project Director

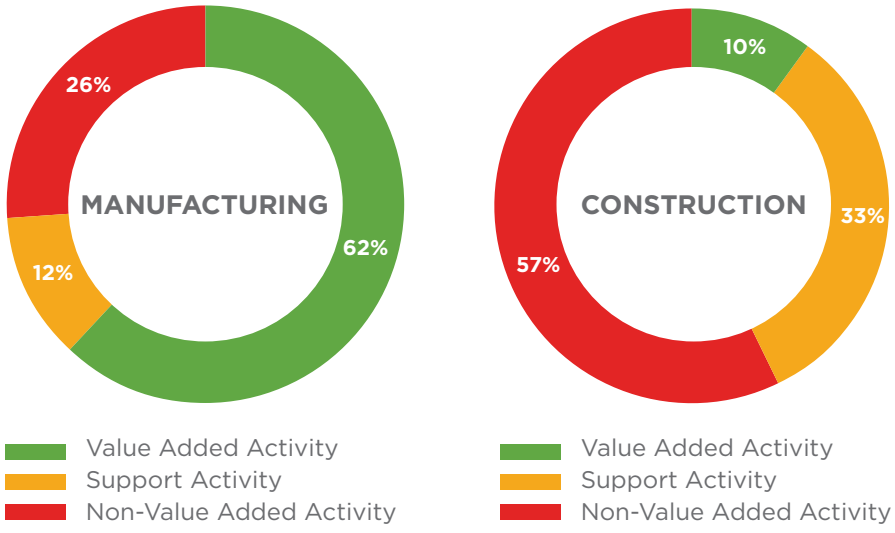
"I have always envisioned a workplace such as this. You have now created a system which exploits the full capabilities of each employee."

C.R - Foreman

Introduction

Engineering and Construction companies suffer from low margins and relatively low productivity, which is a result of the industry's traditional operating model that is not as efficient as it could be.

Many of the optimization tools and systems that other industries adopted decades ago are only now becoming widespread in the construction sector; manufacturing companies had already spent billions of dollars to implement improvement programs in order to decrease their waste by just a few percentage points, while construction companies, with their high level of waste, weren't attempting a serious enhancement.



COMPARISON BETWEEN MANUFACTURING AND CONSTRUCTION PROCESS EFFICIENCY
Source: Construction Industry Institute

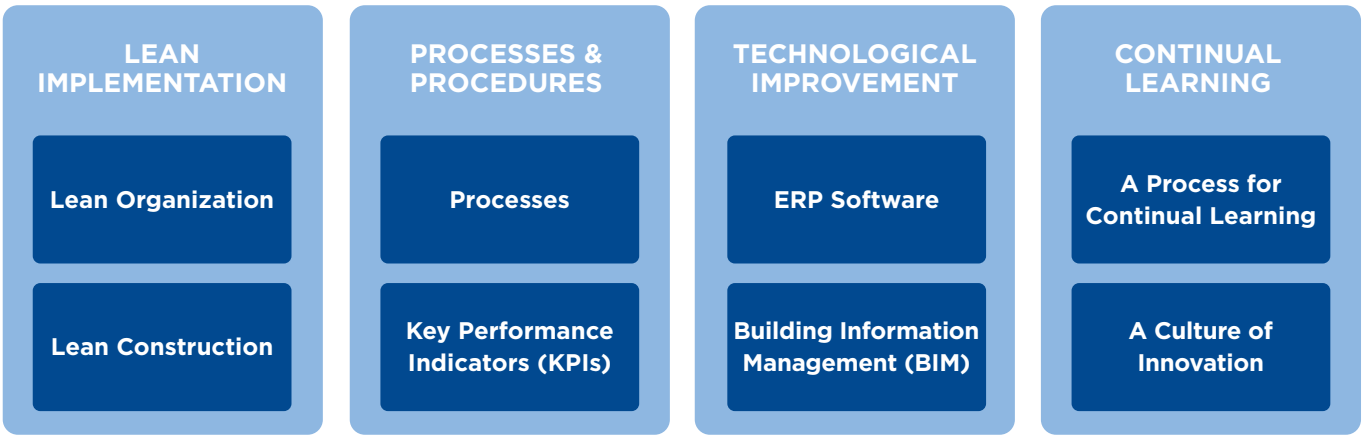
Aiming to always being pioneers in the adoption of the latest practices in the construction industry, we have decided to act, and benefit from the improvements that new systems and technologies can bring to our operations.

We have therefore decided to start by understanding our potential and areas of strength, set priorities and act upon them.

In order to achieve the above, an internal team of managers and operation engineers were assigned by the company to research and implement the Business Improvement Program (BIP), and optimize the way we deliver projects – The MAN Way.

The priorities that we set and which we have started to act upon are the following; standardizing and optimizing our processes, creating an integrated and transparent data and performance-management system using the relevant technologies and software, improving talent development and harvesting innovations.

The chart below categorizes the current transformational initiatives; each of these initiatives is essential, however there is a special emphasis on Lean implementation in this article, since its impact is immediate as it reaches the largest number of employees and stakeholders.



CURRENT TRANSFORMATIONAL INITIATIVES

LEAN IMPLEMENTATION

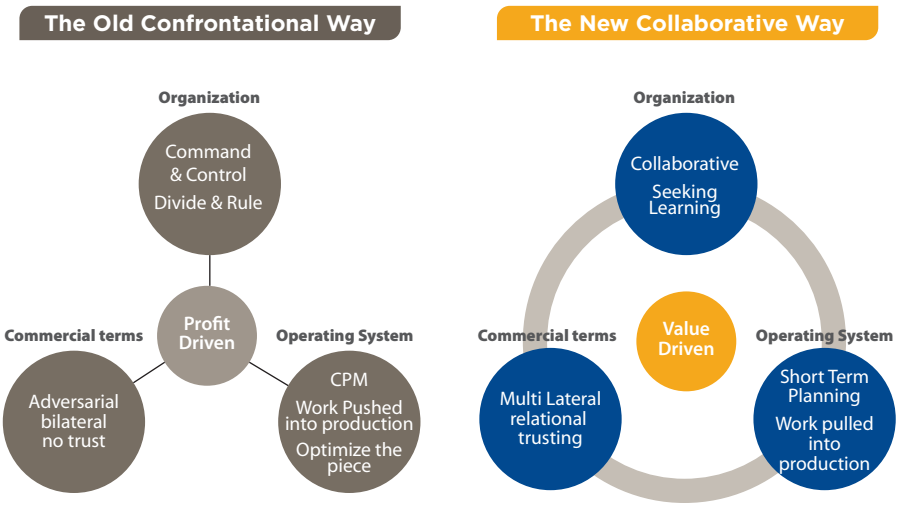
LEAN ORGANIZATION

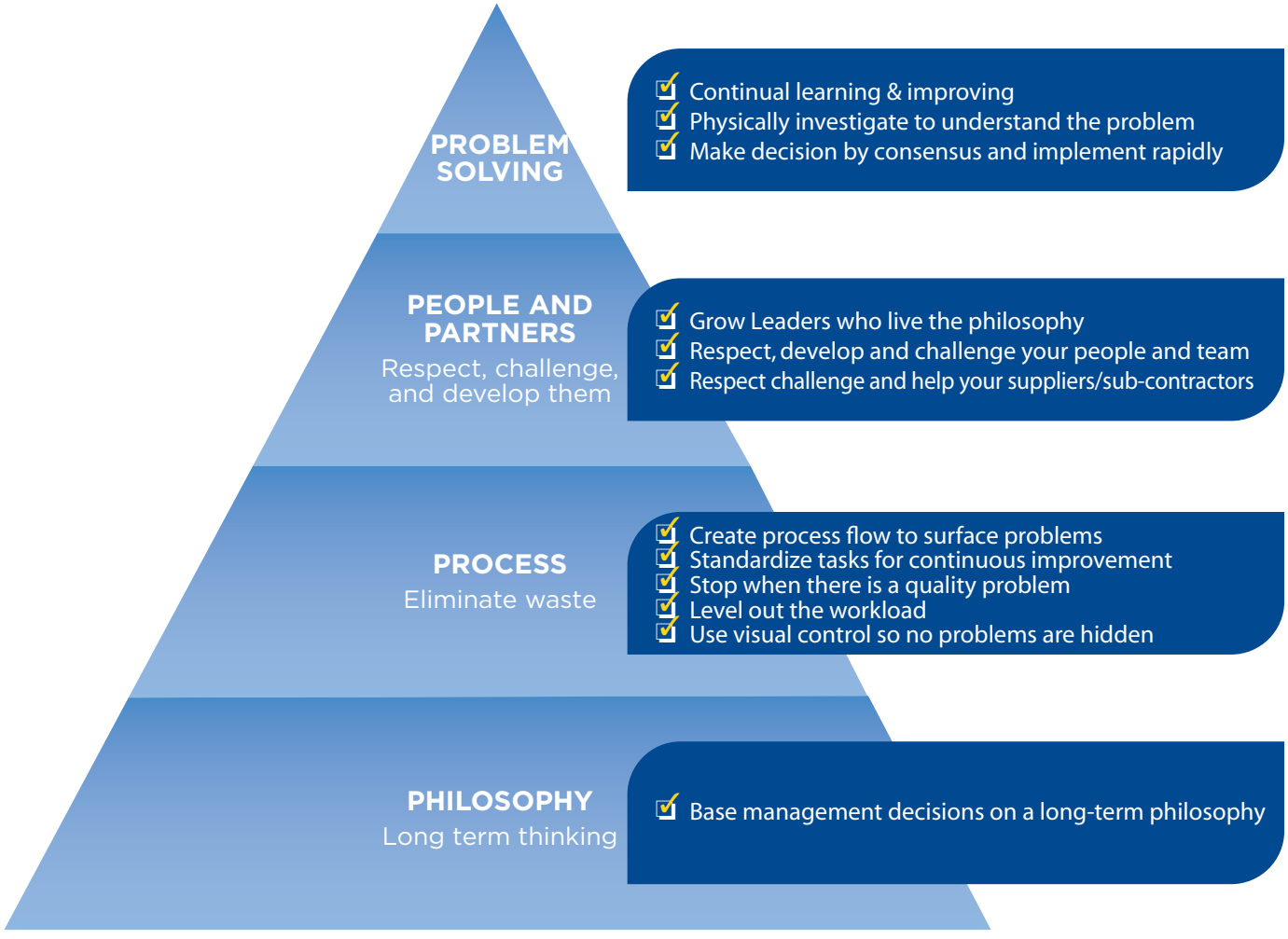
At the core of the initiative is the goal of creating a culture built on a philosophy of becoming more value driven. This will be achieved by creating a collaborative and learning organization that will engage customer trust as shown in the illustrations.

In order to achieve this target, MAN has been inspired by the 4P model of Toyota.

Toyota organizes their 14 key principles into four sections which are detailed in the figure below:

- Long-Term Philosophy
- Processes
- People and Partners
- Continual Root Problem Solving





THE 4P MODE

LEAN CONSTRUCTION

Overview

Lean production started in 1950. It was invented by Toyota and adapted for construction by researchers associated with the International Group for Lean Construction (IGLC).

Lean construction, as a philosophy and a set of principles, was introduced to construction in order to maximize customer value through waste reduction and continuous improvement.

Case studies have reported a 20% to 30% reduction in construction time, a 5% to 12% reduction in cost, and an increase in client satisfaction for projects implementing Lean construction.

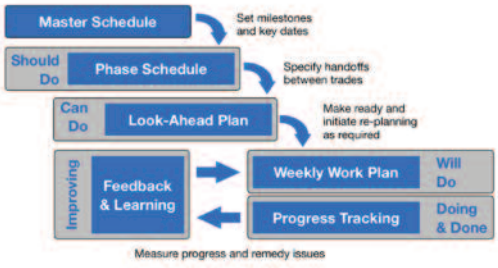
Implemented Elements

A pilot implementation, in addition to other implementations, has already taken place on construction sites: DAMAC Tower Residences/finishing phase, ABC Verdun Mall, District S Residences project in Lebanon, and the Logistic City project in Qatar.

Below is a selection of the key system elements that were developed and implemented to date in addition to an overview of their benefits and pictures from the workplace.

The Last Planner System

The Last Planner System (LPS) is a production planning and control system invented and successfully applied in firms and construction companies. It is based on the concept of Lean production.



THE LAST PLANNER SYSTEM

The War Room

The War Room is where the teams meet on a weekly basis. It is a place where the communication board and the project dashboard are posted.

Waste Walks

A form including the 8 wastes is placed in the common hall of each project.

Each employee is encouraged to identify waste in their daily work and pin them on the board.

Other employees are then encouraged to provide suggestions for solutions for the waste and pin them on the form. In the weekly meeting, the recurring waste and potential solutions are discussed and corrective action is taken.

THE 8 WASTES

PROJECT DASHBOARD AND COMMUNICATION BOARD

PROJECTS WHERE LEAN WAS INTRODUCED

DAILY HUDDLE AND TOOLBOX MEETING

Visual Management

This element provides real-time visual information on the project status. It allows employees at all levels to understand their influence on the project's overall performance and inspire improvement.

The Project Communication Board

The board was developed to communicate the implemented processes, systems, tools, techniques and their benefits, in addition to any other updates.

The Project Dashboard

The dashboard is used to communicate the site Key Performance Indicators (KPIs) and make it attainable for all levels.

PROJECT KPIS DASHBOARD

The Weekly Review and Planning

The site team meets once a week in the War Room to review the last week's performance, collaboratively plan the week, and discuss the resolution of the identified constraints.

All team members are involved in the planning from foremen to project managers, in addition to subcontractor representatives.

Plans are registered as "promises" on a weekly work log and are tracked throughout the week.

Daily Huddles

These sessions are conducted in the mornings between the site engineers, foremen, and their teams.

WEEKLY COLLABORATIVE PLANNING SESSION

The engineer communicates the results of the previous day as well as the plan for that day.

Responsibilities are given to each unit and the teams are commissioned. Once a month, a safety induction is conducted for all teams at once.

The Project Key Performance Indicators (KPIs)

The KPIs are accessible to all project staff and cover time, cost, quality and safety to keep everyone involved and informed about the project performance and aware of any pending issues.

Other System Elements

In addition to the above, other system elements have been developed and implemented:

- Location based schedules
- Risk registers
- Action lists
- Weekly work plans
- Visual schedules and milestones
- Threats and opportunity logs
- Safety review and planning sessions

WEEKLY REVIEW AND PLANNING MEETING

PROCESSES AND PROCEDURES

Overview

In conjunction with the new Lean implementation, the company processes are being mapped and reviewed. The main questions to be considered:

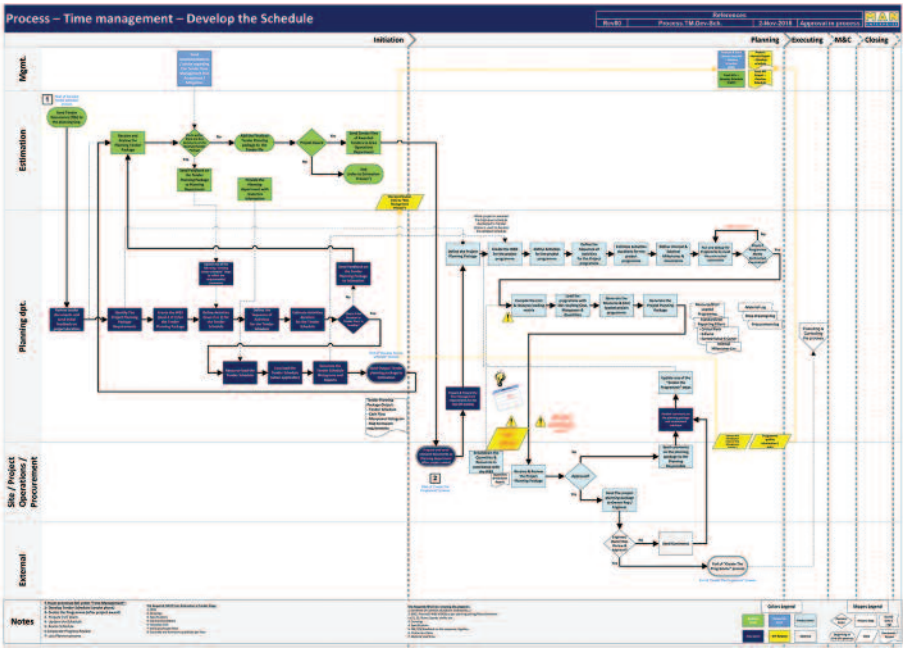
- How can the processes be designed to ensure automatic and seamless flow of information and eliminate non-value adding activities and bottlenecks?
- How can responsibilities and accountabilities be distributed to ensure that the right people are in the correct place with the needed skill set?
- What Key Performance Indicators should be tracked for each process to ensure top performance and continual improvement in all divisions?

The final material will form the company's improved processes and procedures, and will be continuously challenged and improved to reach business excellence.

Processes

- Most of the major processes in the company are mapped
- The project management processes are developed in accordance with the project management knowledge (PMBOK5)
- Inefficiencies and non-value adding process steps and bottlenecks are identified
- Improvement opportunities have been highlighted
- Multiple sessions are being held with the relevant stakeholders in order to draft the new set of improved processes

COMMUNICATION AND WORKSHOP SESSIONS

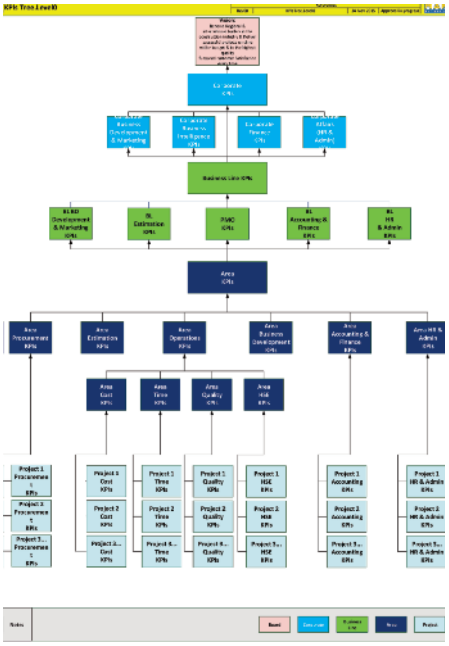


SAMPLE PROCESS FLOW CHART

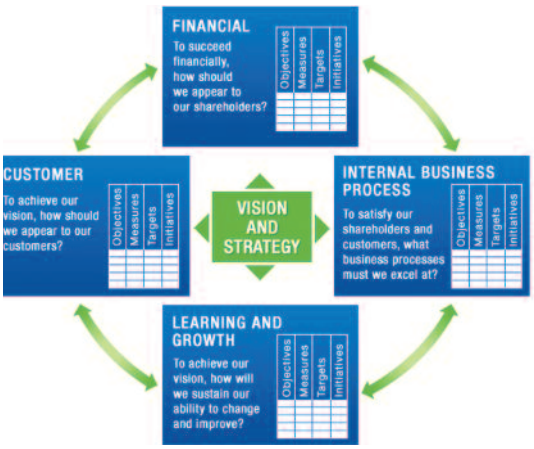
Key Performance Indicators - KPIs

KPIs are designed from the bottom up as demonstrated in the KPI tree. Projects report KPIs related to various functions which are consolidated along the hierarchy.

To accomplish the vision and strategy, the KPIs are measured across the four dimensions of the balanced scorecard, as shown in the illustration.



KPI's TREE



BALANCED SCORECARD

CONTINUAL LEARNING

"I never teach my pupils; I only provide the conditions in which they can learn."

Albert Einstein

At its core, MAN Enterprise believes in the continual education of its employees. Perhaps that originates from our Chairman having once been a University Professor.

A Process for Continual Learning

MAN has chosen to supplement its systematic trainings with other potential solutions for continual learning; the online courses/learning is being currently evaluated.

After having taken trainings/courses, the teams with similar roles would conduct workshops in order to strategize and assess how their work could be improved by adopting what they have learnt; in this manner the innovation would come from the specialists on the ground.

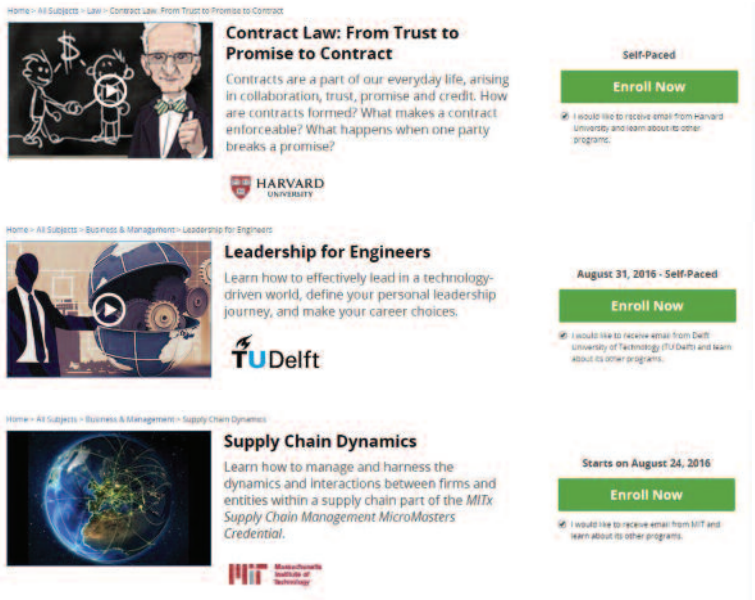
A Culture of Innovation

"Learning and Innovation go hand in hand. The arrogance of success is to think that what you did yesterday will be sufficient for tomorrow."

William Pollard

While innovation used to be considered only by the directors of the company, it has now been embraced at all levels.

Any member with an idea for improvement within their field can propose the idea along with a list of potential benefits. It is then forwarded to management to be reviewed and possibly implemented.



ONLINE COURSES FROM LEADING UNIVERSITIES

Technological Improvement

ERP Software

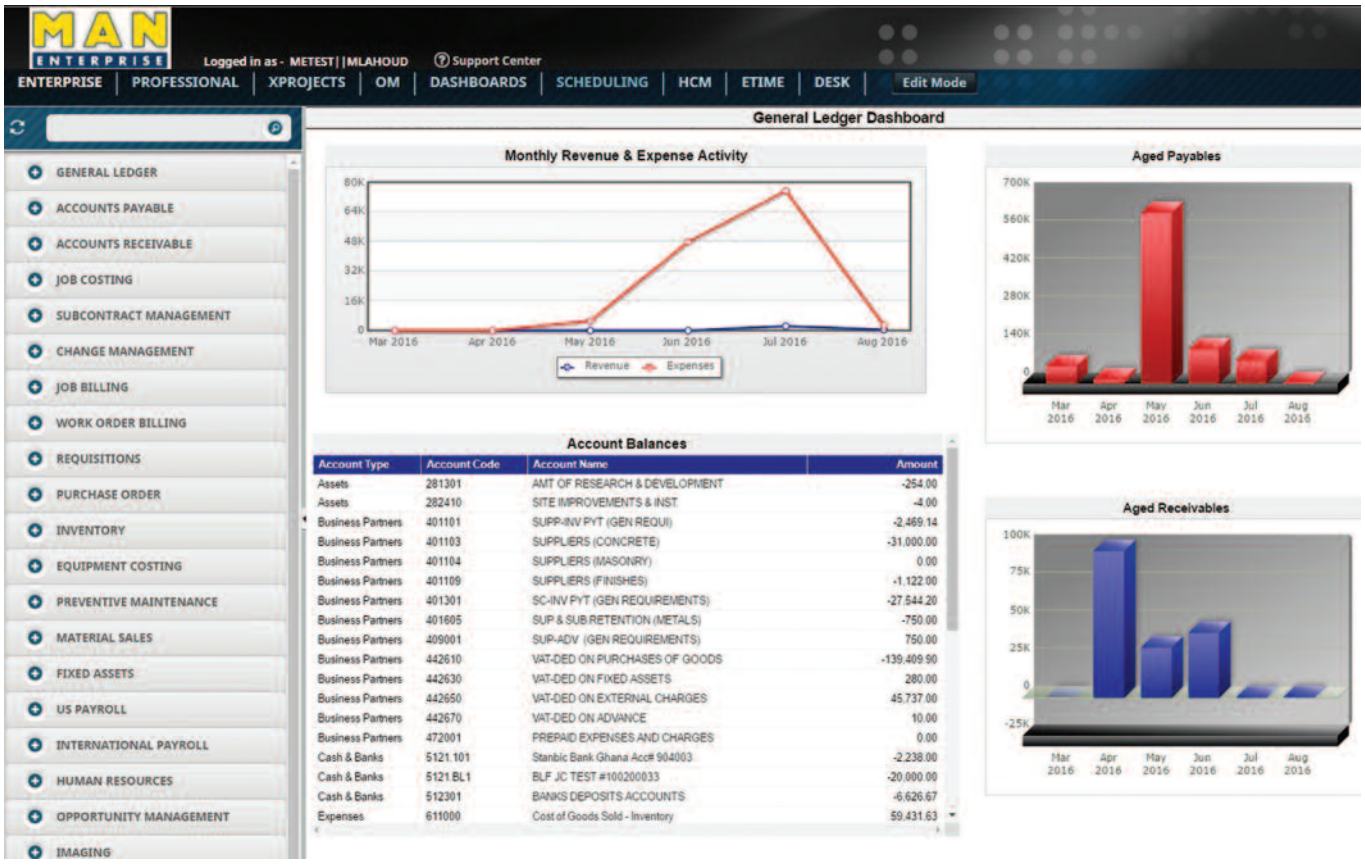
While still mostly unheard of in Lebanon, MAN Enterprise is implementing a full-scale ERP software (Enterprise Resource Planning) in order to build an integrated and transparent data management system and manage its business processes in the Cloud.

ERP is an online software that employees use to streamline processes and consolidate data. Users login from a computer at any location using a user-name and password. The user will then be connected to all responsibilities online.

Having an ERP will increase visibility through live KPI reporting and automatic scheduled reporting.

It is the company's vision to become the most technologically advanced construction company in the Middle East.

ERP SOFTWARE FEATURES



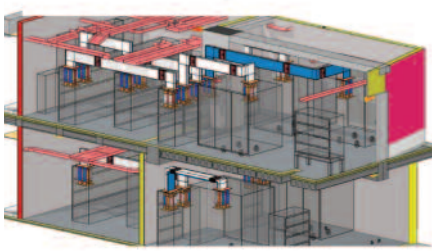
SAMPLE ERP AUTOMATICALLY GENERATED DASHBOARD

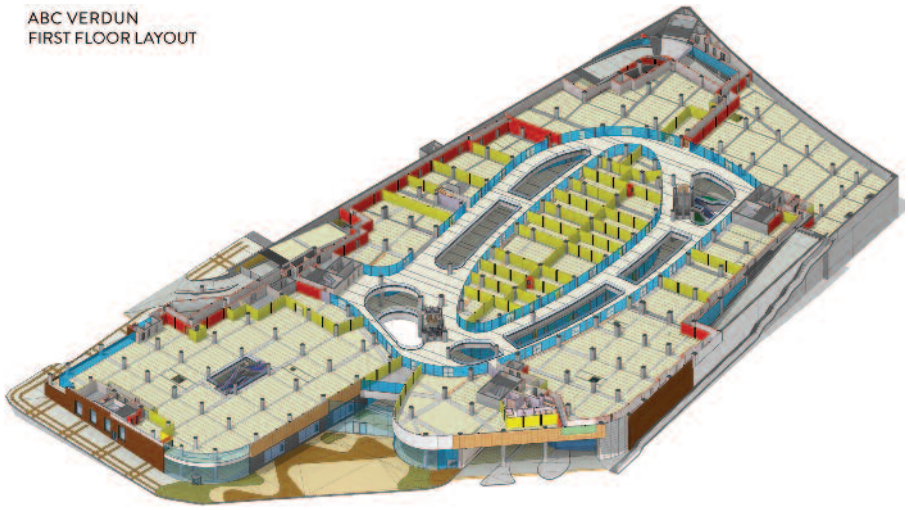
Building Information Management

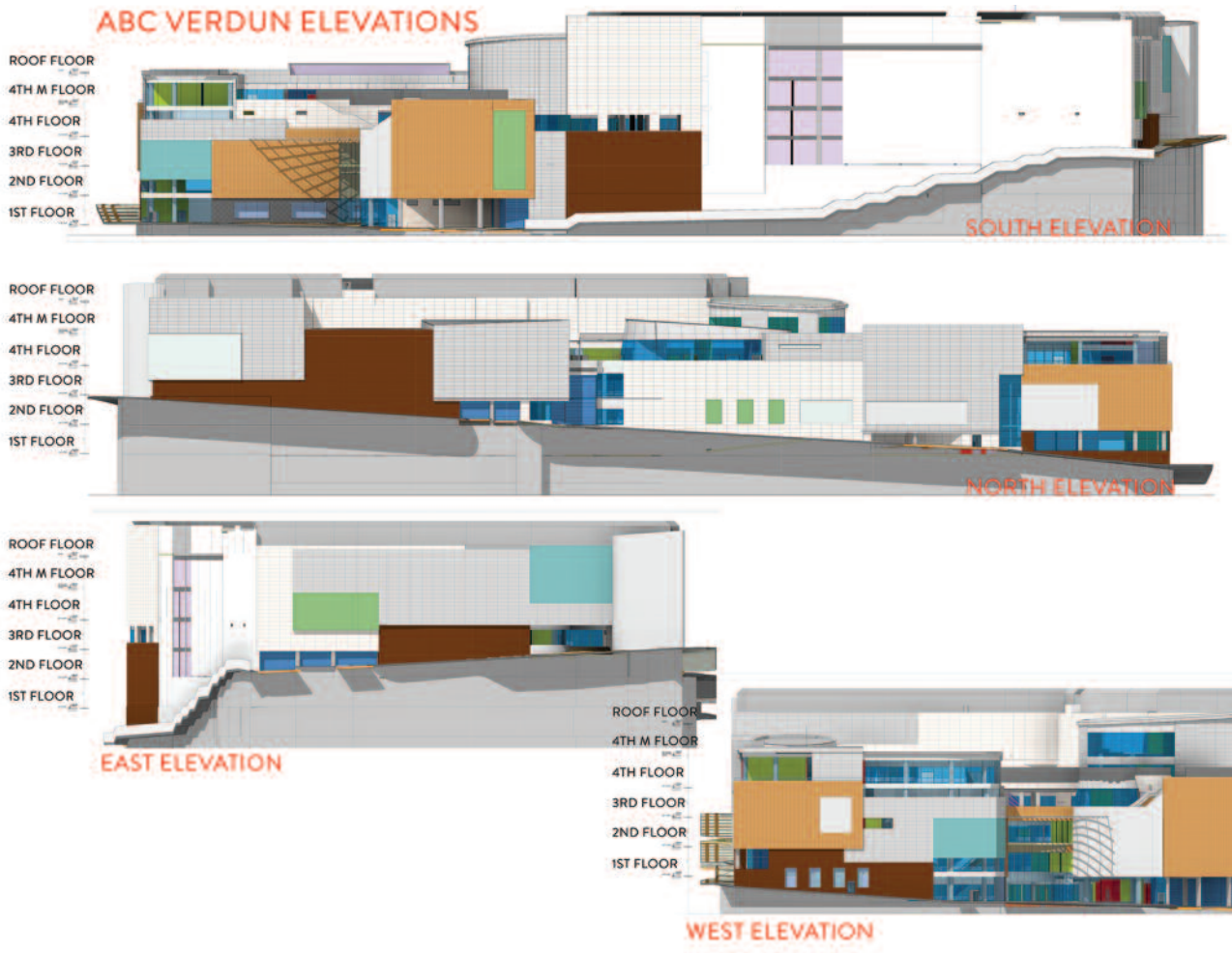
MAN has started utilizing BIM in a number of projects in Qatar and Lebanon. Here below 3D images produced using Revit software taken from the ABC Verdun 3D-model.

The model was analyzed in Navis works and BIM 360 to detect clashes, issue RFIs, visualize the project, issue shop drawings, and extract quantities. In the future, BIM will be used to manage time, perform the Last Planner System, and manage cost and procurement.

BIM will transform the way we deliver projects, collaboratively addressing technical solutions with the architect and strategic planning with the site team. This will definitely assist us in delivering waste-free projects to the client.







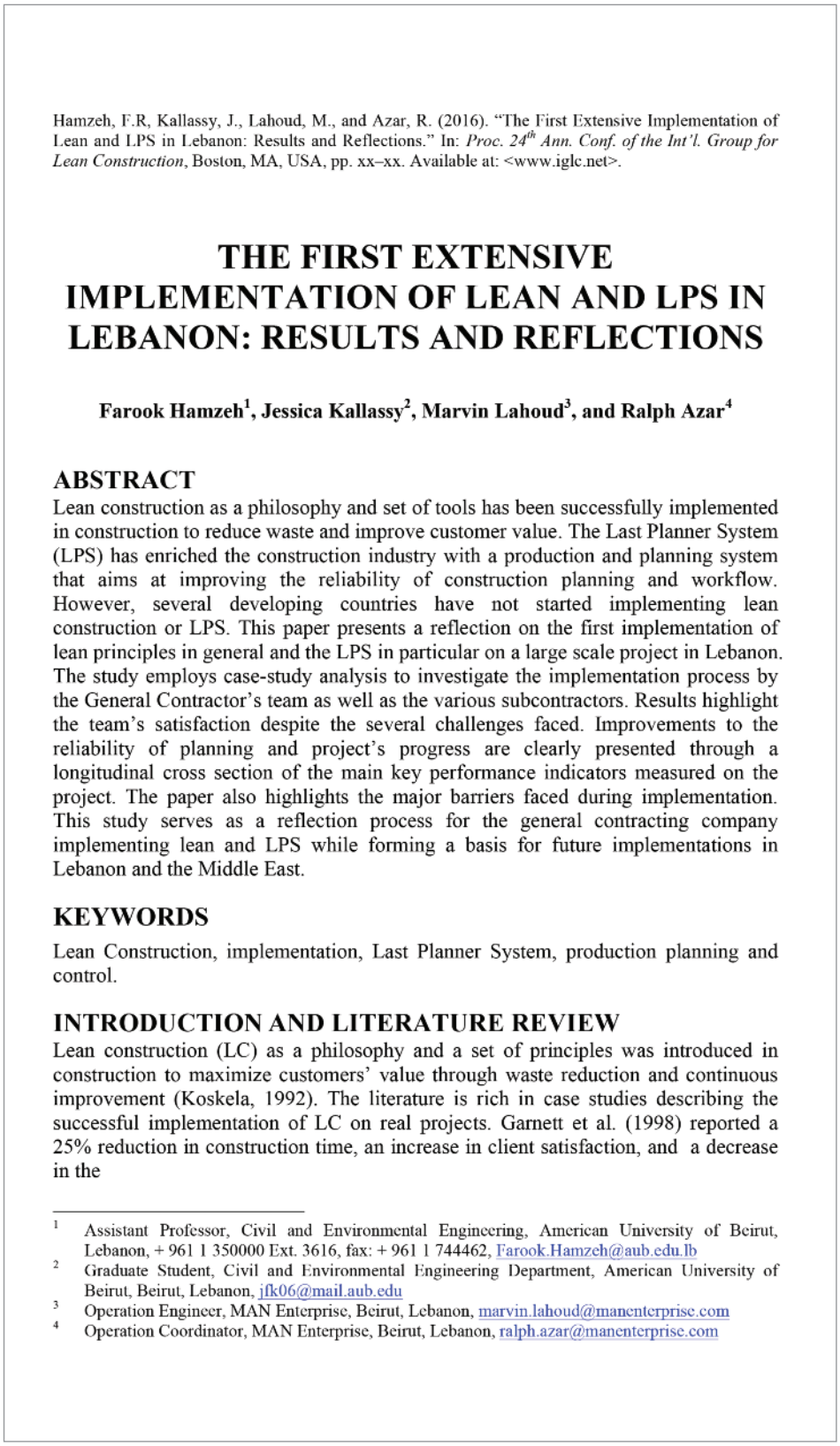
Collaborations and Publications

In lieu of the listed accomplishments, and specifically Lean Implementation, MAN Enterprise started a collaboration with AUB, a leading university in the Middle East, and more precisely with professors from the Department of Civil and Environmental Engineering.

To date, the two organizations have co-authored a paper which will be published and presented in the International Group for Lean Construction - IGLC - 2016 Conference in Boston, USA.

The paper is titled "The First Extensive Implementation of Lean and LPS in Lebanon: Results and Reflections." It describes what MAN Enterprise has accomplished in terms of adoption and implementation of Lean Construction on one of our largest projects, ABC Verdun Project, and which is a premiere in Lebanon. This paper also describes the challenges, learnings, additional improvement opportunities and next steps.

We are looking forward to more positive outcomes and other significant publications from the new collaboration with AUB and IGLC.



Hamzeh, F.R, Kallassy, J., Lahoud, M., and Azar, R. (2016). "The First Extensive Implementation of Lean and LPS in Lebanon: Results and Reflections." In: *Proc. 24th Ann. Conf. of the Int'l. Group for Lean Construction*, Boston, MA, USA, pp. xx–xx. Available at: <www.iglc.net>.

THE FIRST EXTENSIVE IMPLEMENTATION OF LEAN AND LPS IN LEBANON: RESULTS AND REFLECTIONS

Farook Hamzeh[1], Jessica Kallassy[2], Marvin Lahoud[3], and Ralph Azar[4]

ABSTRACT

Lean construction as a philosophy and set of tools has been successfully implemented in construction to reduce waste and improve customer value. The Last Planner System (LPS) has enriched the construction industry with a production and planning system that aims at improving the reliability of construction planning and workflow. However, several developing countries have not started implementing lean construction or LPS. This paper presents a reflection on the first implementation of lean principles in general and the LPS in particular on a large scale project in Lebanon. The study employs case-study analysis to investigate the implementation process by the General Contractor's team as well as the various subcontractors. Results highlight the team's satisfaction despite the several challenges faced. Improvements to the reliability of planning and project's progress are clearly presented through a longitudinal cross section of the main key performance indicators measured on the project. The paper also highlights the major barriers faced during implementation. This study serves as a reflection process for the general contracting company implementing lean and LPS while forming a basis for future implementations in Lebanon and the Middle East.

KEYWORDS

Lean Construction, implementation, Last Planner System, production planning and control.

INTRODUCTION AND LITERATURE REVIEW

Lean construction (LC) as a philosophy and a set of principles was introduced in construction to maximize customers' value through waste reduction and continuous improvement (Koskela, 1992). The literature is rich in case studies describing the successful implementation of LC on real projects. Garnett et al. (1998) reported a 25% reduction in construction time, an increase in client satisfaction, and a decrease in the

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A SNAPSHOT OF THE AUB-MAN PAPER