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Lean/IPD in action – MSU business college pavilion case study

Lean/IPD en Acción – Pabellón de la Escuela de Negocios de la MSU Estudio de Caso

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Abstract
Michigan State University (MSU) is an educational institution that owns one of the largest on-campus housing systems in the US. As part of its operation, MSU is interested in improving the performance of its capital projects. To do so, it has adopted the integrated project delivery (IDP) approach. This article describes some of the key features used by MSU to implement an IPD agreement for building its new MSU Business College Pavilion.
As a result, MSU delivered a successful project, both on cost and on time, an outcome that involved the use of several tools, such as an IPD multi-party agreement, the Lean Execution Plan, Target Cost, and A3, among others. The use of IPD maximizes value, leadership, and innovation while using agreements for sharing risks and rewards. This case´s learned lessons for future projects involve the foster of aspects such as value alignment, collaboration, waste reduction, and periodic review of the effectiveness.

Keywords: *Lean; Integrated Project Delivery; Multi-Party Agreement; Target Cost; A3.*

Resumen
La Universidad Estatal de Michigan (MSU) es una institución educativa que posee uno de los sistemas de vivienda en campus más grandes de los Estados Unidos. Como parte de su operación, MSU está interesada en mejorar el rendimiento de sus proyectos de capital. Para lograrlo, ha adoptado el enfoque de gestión integrada de proyectos (IDP), por sus siglas en inglés. Este artículo describe algunas de las características clave utilizadas por MSU para implementar un acuerdo de IDP para la construcción de su nuevo Pabellón de la Facultad de Negocios de MSU.
MSU ejecutó un proyecto exitoso, tanto en costo como en plazo, resultados que involucraron el uso de distintas herramientas, tales como un acuerdo multi-partes de IDP, un Plan de Ejecución Lean, Costo Objetivo y A3, entre otros. El uso de IDP ha permitido maximizar el valor, el liderazgo y la innovación mientras utiliza acuerdos para compartir riesgos y recompensas. Las lecciones aprendidas de este caso para futuros proyectos incluyen el fomento de aspectos como la alineación de valores, la colaboración, la reducción de desperdicios y la revisión periódica de la efectividad

Palabras clave: Lean; Gestión Integrada de Proyectos; Acuerdo de Multi-Partes; Costo Objetivo; A3.

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1. Introduction

"Success is not just to get to the top of your business but to continue improvement to maintain your ranking on the top"

Michigan State University (MSU) is a Land Grant Research University established in 1855, with 60,000 Students on one campus, of 5200 Acres, one of the largest on-campus housing systems in the USA, and the first public institution to adopt IPD, a multi-party agreement (e.g., Lean Construction Institute, 2023).

MSU's Lean journey started in 2006 with an Integrated Project Delivery (IPD) Project, a true Multi-Party Contract that has had early involvement and close collaboration of trade partners and contractors from the early start of project design. The Business College Pavilion project is the second IPD project on the MSU main campus.

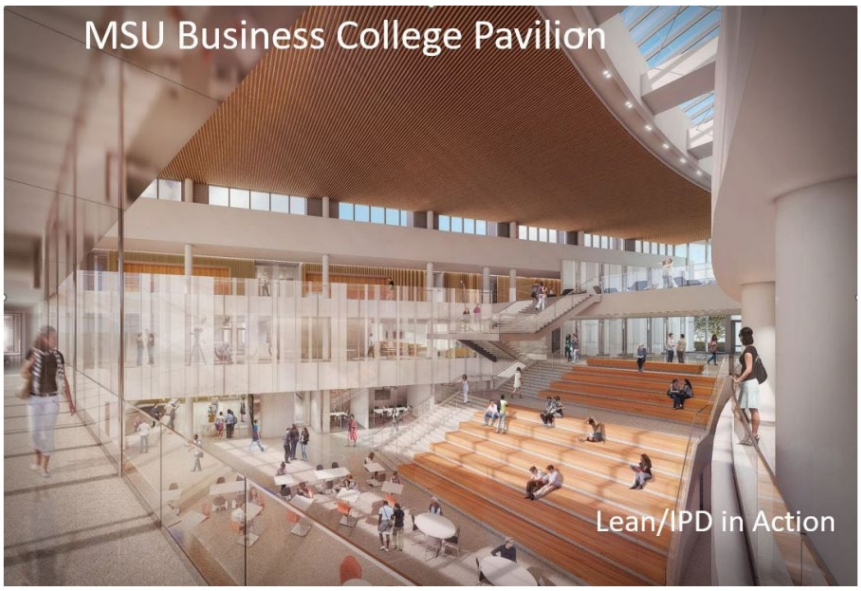

Figure 1. *MSU Business College Pavilion*

The new Graduate Pavilion (Figure 1) provides the opportunity to create a highly visible, statement facility to support the rapidly evolving graduate education needs of the College of Business, one of the leading business colleges in the country. All five of the Business College's academic units are ranked among the top 25 in the country and its flagship MBA program is ranked 11th among public institutions and 6th in terms of ROI in the most recent BusinessWeek rankings. This project needs to reflect both the current and aspirational positioning of Broad College as a leader and innovator in business education.

Approximately 100,000 square feet of new classrooms, laboratories, workrooms, and gathering space are included in the expansion. Added flexibility in workspaces, coupled with new technology, will give students the necessary experiences before they start their the at Google or similar companies.

Change is constant in business; the forces of technology and globalization are revolutionizing how business is conducted. Business College and staff are working to provide a rigorous and innovative curriculum and relevant educational experience to MSU graduates for this changed business environment. With the new Pavilion, MSU will take a significant step forward in its "we make business happen" approach to business education by providing the frameworks, tools, knowledge, and experiences that will fully prepare students for their business careers as leaders, strategic and analytic thinkers, entrepreneurs, and team members.

With a new interactive "collaborative" environment that reflects the real-world workplace model of people working within and across teams to bring products and ideas to market, the Business College Pavilion will support the development of a robust integrative culture for the MBA Program. It will help the college prepare its MBA students to be stronger at

"making business happen" through a program that focuses on teamwork, analytical insight, and an integrated business perspective. The new facility, strong experiential learning component, and new emphasis on social impact will further differentiate the program and enhance the national reputation and standing of the College program.

The Pavilion will help us achieve the aspiration to grow the MBA ranking and become a world-class destination for students and faculty around the globe. And most importantly, it will enable MSU to graduate future dynamic leaders to become trailblazers spearheading change at existing businesses or creating new ventures. The Pavilion will also enable the College to build on its mission to advance a platform of relationships with corporations, employers, alumni, and leading-edge thinkers, as well as capitalize on the strong portfolio of the college's professional master's programs in accounting, supply chain management, marketing research, finance, and business analytics. The facilities, corporate partnerships, faculty, and pedagogical approaches will create a new model of graduate education that will differentiate the Business College MBA and master's programs from other business schools in the country and abroad. It will become a strong draw and strengthen our efforts to recruit and retain top talent.

The Business College Pavilion project contains:

- *Space for interactive learning, collaboration, conferences, competitions, and other events.*
- *Program-specific, state-of-the-art classrooms.*
- *"One Stop" student support services, including advising and career services.*
- *Strategic placement of conferencing areas, student support services, and technology to enhance communication and collaboration among faculty.*
- *Improved and expanded technology.*
- *A "sense of place" for students, partners, and other visitors, faculty, and staff.*

2. Why is MSU interested in IPD?

We are all tasked with doing more with our capital dollars. Explore techniques MSU is using to help overcome institutional inertia and unlock innovation within their project delivery teams. As institutions work to mitigate risk and be more effective with their investment dollars, IPD and aligned incentives are tools that should be considered for major capital projects (Fischer et al., 2017; Ghassemi and Becerik-Gerber, 2011).

Major objectives of MSU's interest in adopting Lean and Integrated Project Delivery IPD have been:

- *Responsibility to customers to provide maximum value.*
- *Strive for constant improvement and prove it.*
- *MSU wants to be a leader and innovator.*
- *Intrigued by stories of successful IPD projects.*

3. Understanding risk and opportunity with IPD project delivery

The Integrated Project Delivery requires a committed contractor, architect, and owner's representative working jointly under the correct contractual terms with sophisticated CAD Lean tools. The team needs to establish joint goals for using Lean tools to enhance productivity, optimize the project schedule, and provide effective collaboration to add value during design and construction(Fischer et al., 2017; Ghassemi and Becerik-Gerber, 2011).

Integrated Project Delivery contract structure relies on using a single contract for design and construction with a shared risk/reward model, guaranteed costs, waivers of liability between team members, an operating system based on lean principles, and a collaborative culture(Matthews and Howell, 2005).

Integrated Project Delivery teams are contractually tied together differently than traditional design/bid/build, CM at risk, and Design/Build agreements. The typical IPD agreement includes the primary design firm, the primary builder, and the owner in a single contract for a single dollar value. The contract lays out the responsibilities of the designer, contractor, and owner but also makes it clear that the success of the project is the responsibility of all three.

The biggest advantage of this delivery method is you have a contractor who is part of the solution from the very beginning. When construction begins, we have somebody very familiar with what they are going to build, where they are going to buy materials, who are the suppliers, and how much it will cost. The fact that they hit the ground running from day

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one is the advantage (Cullen and Hickman, 2012); (Matthews and Howell, 2005).

See Multi Agreement Contract Structure for the Business College Pavilion below (Figure 2)

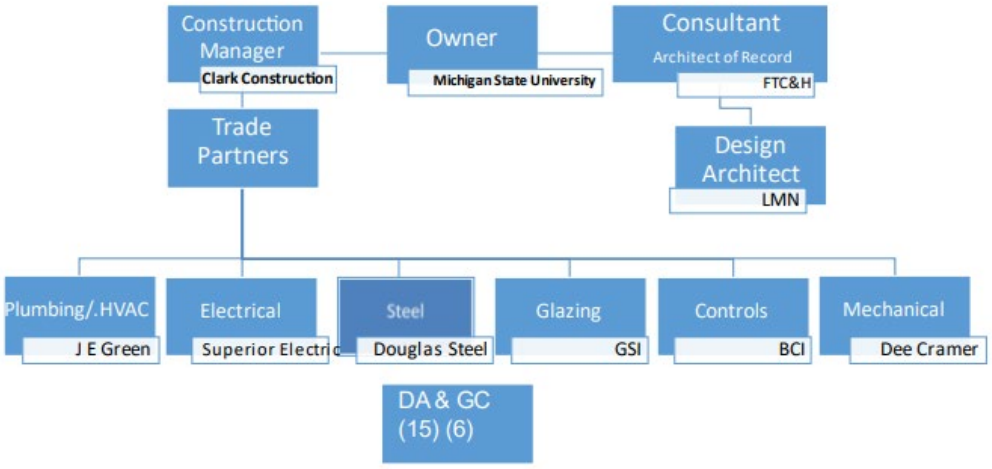

Figure 2. *Multi-Agreement Contract Structure*

4. A Lean Execution Plan

The Project team started by putting together a road map for the execution of the Project. A Lean Execution Plan was created on an 11" x 17" sheet of paper that captured many important aspects of the Project: tentative schedule, teams, conditions of satisfaction, Resources, etc. The Plan set the tone for organizational information with the collaboration of the entire team at the very beginning of the design process. See the Lean Execution Plan below (Figure 3):

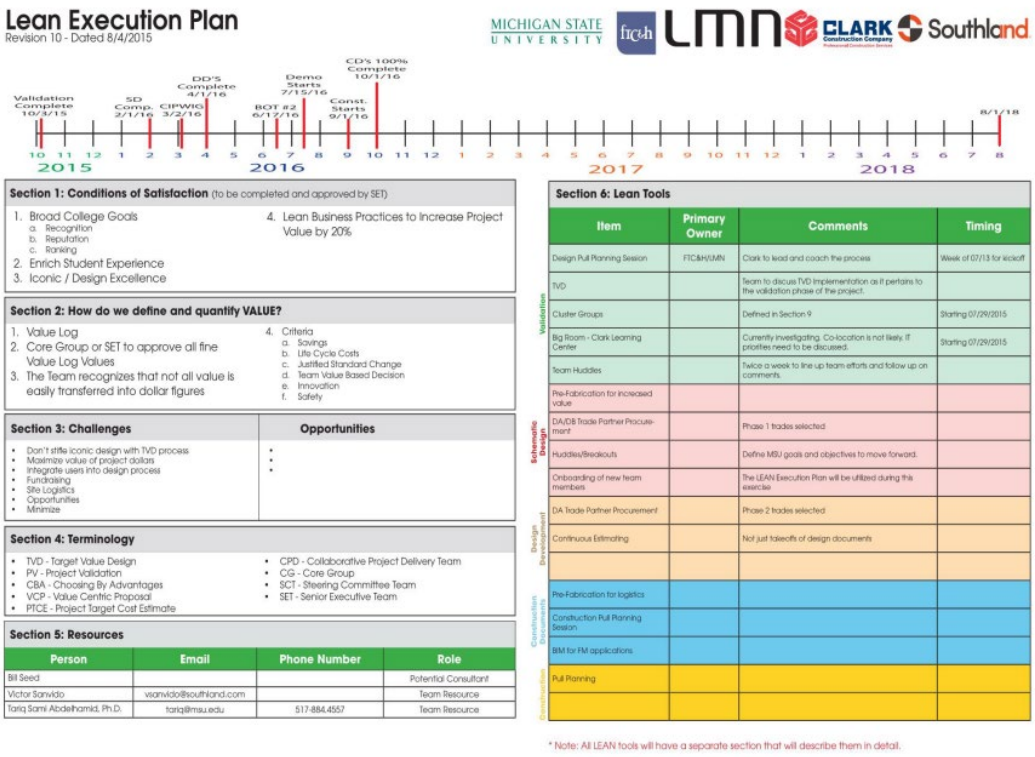

Figure 3. *Lean Execution PlanTarget Cost*

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5. Target Cost

To set the target cost for the Business College Pavilion, the Project Team went through a Validation Phase, in which the entire team was engaged in evaluating design concepts to meet the project program. An early estimating cost was established taking advantage of the expertise of the construction manager and trade partners who were brought early in the planning process. At the end of the Validation Phase, the project team was able to present to the owner the various concepts, associated cost estimates, and anticipated schedule for construction completion. The primary concept of Target Cost is to drive down the cost or maintain cost and increase the value of a project through the design and delivery phases without reducing the quality provided or the schedule for completion (Pasquire et al., 2011; Zimina et al., 2012). Target Cost is a process to make sure that the owner receives all three legs of schedule, cost, and quality. projects tend to increase in cost through the design, and construction phases. Target, Design offers strategies to manage a project's costs through its development and construction (de Melo et al., 2016). Setting cost targets for a team can align thinking and motivate members to innovate (Pasquire et al., 2011). See the Target Cost graph below (Figure 3):

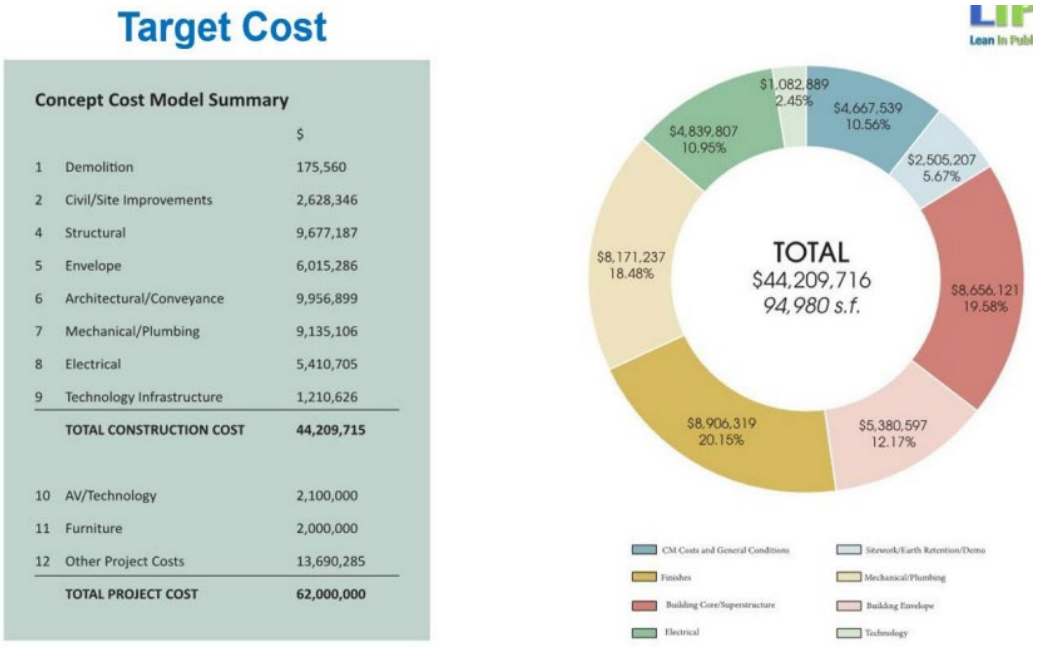

Figure 4. *Target Cost*

6. A3 Reporting

One of the helpful tools that the project team utilized was the A3 reporting. An A3 Report is a Toyota-pioneered practice of getting the problem, the analysis, the corrective actions, and the action plan down on a single sheet of large (A3) paper 11"x17", often with the use of graphics (Lean Construction Institute, 2023a). The A3 for the project was a great executive summary that we shared with the MSU Board of Trustees and other executive committees. The executive condensed A3 Reporting became the preferred method of project reporting to the BOT and other executive committees on Campus (e.g., Figure 4).

7. Conclusions

There have been many other valuable tools and processes that were applied in this IPD project that would go beyond the limited space we have here in this article. It's a delight to report that we have had a $1 million savings that went

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back to the owner and the construction finished three months earlier in the construction schedule. Finally, the following Business College Pavilion IPD Lessons Learned are emphasized:

- *ALIGN VALUES between user groups and design-build teams to leverage thinking across groups in service of the project goals.*
- *COLLABORATE with different disciplines and stakeholders to bring the best information and ideas to the table.*
- *REDUCE WASTE in the process through more up-front planning and fewer last-minute changes.*
- *EVALUATE EFFECTIVENESS in the delivery process and the completed project.*

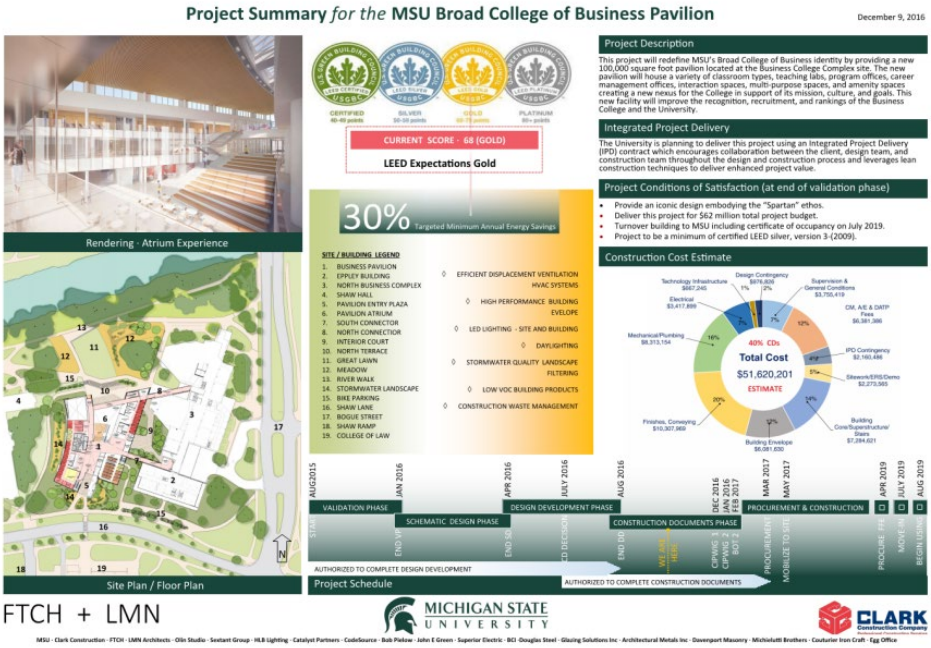

Figure 5. *Project Summary*

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