

EXPLORING THE ROOTS OF LEAN CULTURE AT DPR CONSTUCTION: A CASE STUDY IN LEAN CULTURE

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ABSTRACT

In the past few decades, lean manufacturing principles have been adopted as standard business practices in an attempt to create a less wasteful, more productive, and increasingly sustainable workplace. In particular, companies in the construction industry have focused on this concept to improve quality, productivity, safety and general business. This experience has been variable: while many companies tout the benefits of lean construction, some companies stand out as the leaders in its application, though companies all employ the same lean principles. Research suggests those companies that are most successful implement lean business culture across all levels in the organization.

This paper examines the commonalities between four books discussing lean culture and how the common principles from these books informed the cultural underpinnings of a particularly successful lean contractor, DPR Construction (DPR). Specifically, this paper explores the book *The Toyota Way* by Jeffery Liker, focusing on its four sections of lean management principles and the research and findings on successful business principles in the books *Built to Last*, *Good to Great*, and *Great by Choice* by Jim Collins. The authors compare these books and highlight how their principles support the culture at DPR, which exemplifies an effective lean business culture.

KEYWORD

Lean principles, culture principles, lean culture principles

INTRODUCTION

The intent of this paper is to map DPR Construction's fit with lean culture principles; in particular, the principles articulated by the International Group for Lean Construction (IGLC). This paper exemplifies how lean culture in the construction industry facilitates successful implementation of lean practices and supports IGLC goals. In particular, it supports the IGLC's assertion that the construction industry needs a theory that embodies all elements of a lean organization. The authors describe how a theoretical underpinning of culture supports operating a lean business culture, in turn supporting IGLC's arguments for a theory of lean construction.

The authors argue DPR developed their culture in accordance with lean culture theories, particularly from four pieces of foundational work in lean culture: 1) The

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book, *The Toyota Way* (Liker 2004); because of its stance and study of lean management principles which translate into lean culture; 2) The books *Good to Great* (Collins 2001); 3) *Great by Choice* (Collins and Hansen 2011), and; finally, 4) *Built to Last* (Collins and Porras 1990), for their researched material on cultural business principles that highly successful, lasting companies have shared during varying historical and economic environments.

This paper maps the four sections of management principles cited in *The Toyota Way* (Liker 2004) to the successful business principles described in *Good to Great* (Collins 2001), *Great by Choice* (Collins and Hansen 2011), and *Built to Last* (Collins and Porras 1990) and finally, to the founding fundamental principles of DPR, illustrating DPR's pursuit of lean culture within their organization. The authors highlight how DPR Construction developed their own lean business culture based on theories found in the previously-mentioned books and how this lean culture supports their success. Specifically, the authors discuss how lean culture supports great results, customer satisfaction, top industry rankings, community involvement, and market leading work. Finally, the authors' comparisons illustrate that operating under the theory of lean culture directly aligns successful decision making in lean with successful business principles.

FOUNDATIONAL WORK

This section begins with a definition of organizational culture and then summarizes the research of Jeffery Liker and Jim Collins on lean culture, and this work provides the authors of this paper a foundation to derive a theory for lean culture. Note the authors do not claim this is the only work in lean culture; rather, it is work that DPR leveraged to develop their culture. The authors base the theory on the Merriam-Webster definition of theory: the general principles or ideas that relate to a particular subject. The authors use the *Toyota Way* by Liker to establish lean principles and *Built to Last*, *Good to Great*, and *Great by Choice* by Collins to establish culture principles, which relate to the subject of lean culture theory. The authors emphasize the following words printed in bold as the descriptive derivative of each principle, i.e. lean and cultural principles, respectively, which best describe and relate to the subject of lean culture.

The authors assert it is first critical to assure a shared understanding of the term "culture" in the context of this paper. To that end, they borrow the definition of organizational culture from Ravasi and Schultz (2006): "organizational culture is a set of shared mental assumptions that guide interpretation and action in organizations by defining appropriate behavior for various situations." Essentially, organizational culture is the shared understanding of the organization's values on the part of all employees. Ravasi and Schultz further argue that management can manage culture through continual repetition of organizational values and evaluation of whether or not employees demonstrate the "organizational" interpretations and mental assumptions consistently.

This study's foundation for lean management principles is *The Toyota Way* (Liker 2004) which uncovers 14 management principles that form the foundation for Toyota's revolutionary "lean production." Liker divides the 14 management principles into four sections: 1) long-term **philosophy**, 2) the right **process** will

produce the right results, 3) add value to the organization by developing your **people** and partners, and 4) continually solving root problems drives organizational **learning**.

The authors found the main descriptive derivative for each of the four lean management principle sections in *The Toyota Way* to be:

- Philosophy
- Process
- People
- Learning

This study's *foundation* for cultural principles: *Built to Last*, *Good to Great*, and *Great by Choice*, in-part or entirely, by Jim Collins.

Collins describes his book *Built to Last*, as a study of the founding, growth, and development of eighteen exceptional companies that have stood the test of time. By studying these companies, Collins was able to uncover timeless fundamentals that enable organizations to endure and thrive. The authors of this paper used the following four fundamental principles, derived from Collins writing, for this research: 1) build a company around a core **ideology**, 2) clock **building**, not time telling, 3) build a cult-like **culture**, and 4) preserve the core and stimulate **progress**.

The authors found the main descriptive derivative for each of the four lean cultural principle sections in *Built to Last* to be:

- Ideology
- Building
- Culture
- Progress

Collins describes his book *Good to Great* as a study regarding why some companies make the leap to greatness and others do not. By studying these companies, Collins found that each of these transformations was characterized by a commitment to excellence process, based on fundamental principles, which kept each company, its leaders, and its people on track. The authors of this paper used the following four fundamental principles, derived from Collins' writing, for this research: 1) disciplined **thought**, 2) flywheel **momentum**, 3) disciplined **people**, 4) disciplined **action**.

The authors found the main descriptive derivative for each of the four lean cultural principle sections in *Built to Last* to be:

- Thought
- Momentum
- People
- Action

Collins describes his book, *Great by Choice*, as a study of managing through chaos and describes why some companies thrive in doing so. By studying these companies during a fast-moving, unpredictable, and rapidly changing environment, Collins found that companies achieved spectacular results largely due to distinctive,

fundamental behaviors of their leaders. The authors of this paper use the following four behavioral principles from *Great by Choice* for this research: 1) fanatic **discipline**, 2) empirical **creativity**, 3) level five **ambition**, and 4) **productive paranoia**.

The authors found the main descriptive derivative for each of the four lean cultural principle sections in *Built to Last* to be:

- Discipline
- Creativity
- Ambition
- Productive

Based on the research presented above, the authors of this paper documented descriptive commonalities between lean management principles and successful business culture principles. They found that the four lean management principles in the *Toyota Way* and the four successful cultural principles in *Built to Last*, *Good to Great*, and *Great by Choice*, respectfully, relate to the theory of lean culture.

Table 1 summarizes the authors’ findings by matching the descriptive derivatives of each piece of the foundational works’ lean and cultural management principles. Table 1 shows the relation of lean culture principles, summarized by their descriptive derivative, with one another from across the foundational literature. Each group, 1 through 4 as seen in the table, host a common theme that relates to lean culture. These groups of descriptive derivatives illustrate the theory of lean culture within an organization. Furthermore, the descriptive groups in Table 1 highlight the cultural underpinnings of DPR Construction, which exemplifies an effective lean culture.

Table 1: Descriptive Derivative Words of Lean Culture Theory

Group	The Toyota Way	Built to Last	Good to Great	Great by Choice
1	philosophy	thought	ideology	discipline
2	process	momentum	building	creative
3	people	people	cultures	ambition
4	learning	action	progress	productive

BACKGROUND: DPR COMPANY PROFILE

DPR Construction, Inc. was founded in 1990 by Doug Woods, Peter Nosler and Ron Davidowski, (the D, the P and the R). DPR intended to approach construction as a service business rather than as a manufacturing business (DPR 2014). To that end, DPR is a full-service contractor serving 5 core markets, near exclusively in the United

States. DPR employs more than 2,500 people across their nineteen U.S. offices. DPR adopted lean construction in support of one of the company's core values, namely "pursuit of being ever forward and harnessing continuous improvement at all levels." This spirit empowers employees to search for room to improve and help each of the processes the company engages in to become more lean. It encourages decision making to be made at the lowest possible levels, where information is most readily available, and intellectual waste at higher levels is never wasted; ultimately leveraging a very lean decision making process. Said process requires personal accountability, self-initiative, discipline, and learning for each of DPR's employees.

METHODS

Relying on the compiled researched knowledge set forth by the foundational work, the authors set the objective of explaining the success of DPR in terms of their culture that facilitates lean practices and in turn, success. To do so, the authors seek to map the groups in Table 1 to DPR's founding principles, which underpin their company culture. Once the mapping was complete, the authors argue the case that the culture supports the company's success.

The authors note that measuring culture is a difficult task, and one outside the scope of this paper. While certain aspects of the organization lend themselves to measurement, e.g., profit, other aspects, e.g., to be one of the most admired companies by 2030, do not. More research around measuring and quantifying culture may be required within the IGLC community. For the purposes of this paper, assessments of culture included observation by the authors, a review DPR's documentation on company values and culture, and personal communications between the authors and DPR employees focused on culture. Finally, the lead author is a DPR employee and brings his personal experience to bear on this paper.

The authors note they selected DPR as a case study for two reasons: (1) DPR has been an avid supporter of and participant in the IGLC and as such, DPR wanted to evaluate how involvement in this organization influences their culture; and (2) DPR takes organizational culture very seriously and evaluates a potential employee's ability to fit into their culture in hiring decisions.

MAPPING DPR'S CULTURE TO THE FOUNDATIONAL WORK

The authors begin their analysis by examining the background of DPR, dating back to its origination. Along with DPR's impressive pace of growth and revenue generation (reaching \$2.5 billion annually from 1990 to 2013) the true value, in the case of this study, comes from the cultural principles and business practices that the company was founded on. The authors attribute DPR's lean culture to these founding principles and practices and they map these principles to the foundational work.

Table 2 presents DPR's founding principles and maps them directly to the foundational work of Liker and Collins, illustrating how the founding fundamentals as the form DPR's lean culture.

Table 2: DPR’s Founding Principles

Element of DPR Culture	DPR’s Founding Principles
Purpose	DPR Exists to Build Great Things
Core Values	Integrity, Enjoyment, Uniqueness, Ever Forward
Mission	To be one of the most admired companies by the year 2030
Core Markets	Advanced technology, corporate office, healthcare, higher education, life sciences
Vivid Descriptions	People practices, quality and innovation, brand image and “bullet smart”, integral and indispensable, great results and financial returns
Niches	Regional self-perform work, Special Services Groups
General Operations	Innovation Team, Hardin acquisition, use of advancing technologies

In consideration of Table 2, the authors immediately noted direct correlations to the DPR’s principles to those of Liker and Collins in the foundational work. In fact, the authors found that every DPR fundamental mapped directly to the lean culture principles of the foundational work. As the authors [analysed](#) each fundamental, it became obvious that DPR customized a lean culture that would work for their company, in the construction industry, based on the proved lean culture principles for manufacturing organizations. Figure 1 shows how the authors map DPR’s founding cultural principles to the lean management and successful business culture principles described in the foundational work.

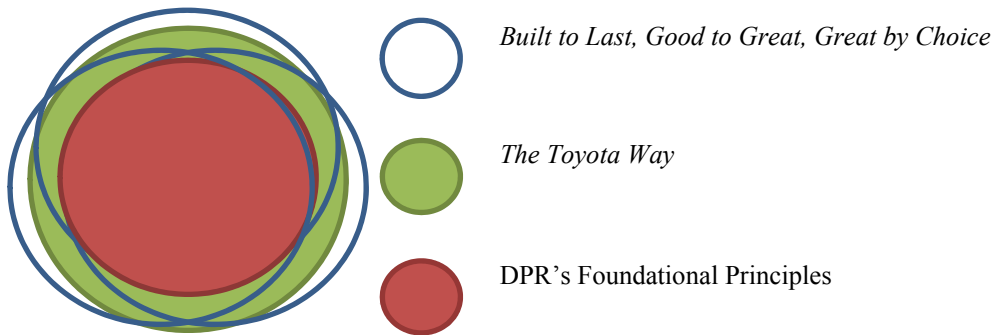


Figure 1: DPR’s Lean Culture Concept

In accordance with the diagram above, the authors note that, while the bulk of Collins' work directly aligns with Liker's, not all of Collins' work falls within the framework of Liker's. The detached areas of the Collins' books circles show this slight separation. The break up symbolizes aspects of *The Toyota Way's Toyota Production System* for exceptional manufacturing, which do not necessarily align with business culture as expressed by Collins.

Of particular note in Figure 1 is the alignment of the DPR Foundational Principles within the circles representing *The Toyota Way* and Collins' work. The substance of DPR's founding principles (Table 2) incorporate, in whole or in part, the principles discussed in in the foundational work of this paper. The DPR culture draws on lean management principles from *The Toyota Way* combined with successful cultural principles from *Built to Last*, *Good to Great*, and *Great by Choice*; naturally creating a lean culture. The authors' figure makes illustrates that DPR's culture is a culmination of the lean culture principles found across the entire foundation work review. DPR founded their lean culture on principles found in the work of Liker and Collins because of these authors clearly articulated how culture supports success.

It bears mention that the DPR culture includes tenets beyond those related to lean construction, e.g., DPR's mission to be one of the most admired companies by 2030. However, lean practices permeate all aspects of the culture. Lean may define the culture, e.g., "people practices" and "quality and innovation", both lean tenets, form DPR's vivid descriptions. Lean may also be the vehicle by which DPR achieves its culture. For example, DPR's purpose statement is "We exist to build great things." In order to build great things, DPR implements lean construction on their projects to understand what the owner wants and to coordinate work to ensure on-time and on-budget project delivery.

COMPARISON OF DPR'S FOUNDATIONAL PRINCIPLES AND THE FOUNDATIONAL WORK

This section presents a high-level comparison of DPR's culture with the descriptive derivatives from the foundational work principles, reinforced with construction industry relevance. The authors emphasize that the descriptive derivative words can be organized in any order when describing DPR's culture.

DPR's Purpose: DPR Exists to Build Great Things

- **Relation to Foundational Work Principle Group 4; Learning/Action/Progress/ Productive:** In building great things, DPR takes an approach of *learning* how to build great things, taking *action* towards building great things, making *progress* in the building of great things, and remains *productive* in the building of great things even after said great things are built.
- **Construction Industry Relevance:** DPR's purpose statement is a catch-all statement which transcends simply building construction projects. The company strives to build great relationships, great people, great teams, and great value in every endeavor.

DPR's Core Values: Integrity, Enjoyment, Uniqueness, Ever Forward

- **Relation to All Foundational Work Principle Groups:** DPR's core values reach across all of the foundational work principle groups.
 - Integrity to DPR is: conducting business with the highest standards of honesty and fairness in order to be trusted. This description is a clear *philosophy* of ethical *thought* and *discipline* to achieve the *ideology* of trust.
 - Enjoyment to DPR is: believing work to be fun and intrinsically satisfying, if not, something is wrong. This description is emulating that work at DPR is fun *process*, where enjoyment springs *creativity* and *builds* productive *momentum* for the company, if work was not fun there would be no productive momentum.
 - Uniqueness to DPR is: being different and more progressive than all other construction companies in the stance for something. This description allows the entrepreneurial spirit of the DPR *people* to innovate within the disciplined framework of the DPR *culture* with endless and self-less *ambition*.
 - Ever Forward to DPR is: the belief of self-initiated change, improvement, learning, and the advancement of standards for their own sake. This description is the backbone of DPR's continuous improvement culture, enabling constant *learning*, followed by aggressive and innovative self-driven *action* in the search of continuous *progress* to consistently be as *productive* as feasibly possible.
- **Construction Industry Relevance:** DPR's core values, taken together, align with the service-based construction industry that DPR positions itself in. In a customer- and employee-focused sense, the four, simple core values articulate everything DPR passionately stands for as a company. Further, these values are sustainable in every sense.

DPR's Mission: To be one of the most admired companies by the year 2030

- **Relation to Foundational Work Principle Group 1 – Philosophy/Thought/Ideology/Discipline:** DPR's mission statements, when first written in 1990, have always focused on a long-term *philosophy*, with the *thought* of being a highly admired company. This *ideology* instills itself into the minds and efforts of all DPR employees to the extent that they are *disciplined* enough to actually make it happen.
- **Construction Industry Relevance:** Again, with its mission statement, DPR transcends staying within the construction industry. The company's first mission statement, written in 1992, stated that DPR was to be a truly great construction company by the year 2000; which is now credibly accomplished. Today, DPR strives to be more than simply a great construction company; rather, DPR wants to be one of the most admired companies (in and outside of the construction industry) by 2030.

DPR's Core Markets: Advanced technology, corporate office, healthcare, higher education, life sciences

- **Relation to Foundational Work Principle Group 2 – Process/Momentum/Building/ Creativity:** DPR did not define their core markets by chance. DPR underwent a *process* to determine which markets the company was considered the best in the world at building in. This lead to the *momentum* of gaining work in the specific markets. Then, DPR proceeded by *building* a reputation as the best in each market. DPR can now take *creative* approaches while expanding their work within the defined core markets.
- **Construction Industry Relevance:** Defining core market sectors for chasing construction work is a lean process. It decreases numerous aspects of waste (time, resources, capital, etc.) by not allocating efforts in a market where the company has no presence.

DPR's Vivid Descriptions (what the company sees in its people, currently and in the future): People practices, quality and innovation, brand image and “bullet smart”, integral and indispensable, great results and financial returns

- **Relation to Foundational Work Principle Group 3 – People/Cultures/Ambition:** DPR considers their *people* to be the company's greatest asset; the company invests in and develops its people unlike any construction company. This builds a *culture* within the company that drives innovation, entrepreneurialism, and discipline resulting in *ambition* of the company mission.
- **Construction Industry Relevance:** DPR's vivid descriptions of their company display the attributes of what it takes for a company to excel in the construction industry. With the vivid descriptions to set a standard, DPR can choose employee candidates, aim for and document quality and innovation, direct marketing efforts, create a need for company services within the community, and conclusively generate great results.

DPR's Niches: Regional self-perform work, Special Services Groups

- **Relation to Foundational Work Principle Group 2 – Process/Momentum/Building/Creativity:** DPR's application of niche work expertise was formed by a *process* of empirical validation by each regional office. Once validated, the niche work expertise provides *momentum* to regional operation by *building* its market share presence and economic returns. The region can then *creatively* apply niche work expertise to gain more work. The same is exactly true for the utilization of special services groups in core markets. (Niche work services vary by region depending on success of the implementation; e.g., self-perform concrete, drywall, etc.)
- **Construction Industry Relevance:** By validating the success of niche work expertise per region, DPR can continue to increase margins across its regions in a lean use of its intellectual resources, time, and capital.

DPR's General Operation: Innovation Team, Hardin acquisition, application of advancing technologies

- **Relation to All Foundational Work Principle Groups:** DPR's general operations, like its core values, reach across all of the foundational work principle groups. The mindset of the entire DPR culture is geared toward long-term philosophy, not compromising core ideologies, which the company lives by with discipline, for short-term gains. DPR's greatest assets are the right people with intense and selfless ambition, self-initiated thought, quick action capabilities, and immense learning capacities. The company follows validated processes that have proven to be productive for more people than just the construction company itself. The DPR Innovation Team accepts company-wide creative ideas and evaluates and implements these to keep the entire company moving ever forward. The company's use of advancing construction technologies at all internal work levels is unparalleled and supports maximum productivity. DPR's recent acquisition of Hardin Construction, in May 2013, is a clear momentum builder. DPR made the acquisition at a disciplined to facilitate accomplishing the company mission.
- **Construction Industry Relevance:** DPR's Innovation Team, application of advancing technologies, and acquisition of Hardin Construction have accelerated the company in all aspects of the construction industry from consistent modernization, to higher productivity, to higher market share. Moreover, these moves improve safety, increase collaboration, and beyond.

DISCUSSION: DPR'S CULTURE FACILITATING SUCCESS

"Our distinct purpose of building great things and the core values we dialed in on (integrity, enjoyment, uniqueness, ever forward) emulate the way we like to work and we like to live and transcend into the way we do business, again doing something different in an industry that has not always had a reputation for integrity and doing things right the first time," said Ron Davidowski (quoted in (DPR 2014) when asked about the founding days of DPR Construction. Ron Davidowski's (the "R" of DPR) statement communicates the meaning of lean culture to DPR. DPR's daily work activities portray lean culture theory principles; moreover, DPR employees live, share, and grow these principles everyday across the entire company. As explained by Davidowski, the emulation of lean culture transcends deep into underpinnings of DPR's operating and cultural fabric, subconsciously making the company lean and unique in everything it does. As long as its lean culture is held at its core, DPR can feel free to change and adapt everything else; an attribute crucial for a successful construction company.

The theoretical underpinning of DPR's custom lean cultural principles support DPR's lean operations. Indeed, the founders of the company considered culture right from the start, and have always believed aligning culture to lean theory will yield success in the construction industry. The resulting culture feels like a way a life to individuals of the DPR organization- they live it in and out of the office everyday- they do not know any different. The culture is lean, it supports continuous improvement, and promotes employees understanding of the company's core values that can be used as motivation for continuous improvement and innovation.

It was DPR's belief in the theory of a lean culture that led the organization to select founding principles that addressed and formed a company culture. DPR's success in customizing and adapting these principles (found in the foundational work) illustrates the benefit of lean culture.

LESSONS LEARNED AND RECOMMENDATIONS FOR OTHERS

DPR Construction has realized success in their markets, and they attribute much of this success to their people and their culture. DPR reinforces their values and in turn, culture in a variety of ways, including:

- Posting the core values of the company, along with its mission, in every office and on every jobsite.
- Being people-centred in business and employment. For example, most DPR offices field recreational sports teams and include workout facilities at the office to support the health and well being of the employees.
- Mentoring employees in self-growth that aligns with the company culture.
- Evaluating a potential employee's "fit" with the DPR culture before making an employment decision.

While the aforementioned actions support and reinforce the culture, DPR employees emphasize the people-centric nature of the company. Thus, simply implementing the above actions may not yield a lean or successful organizational culture. Rather, to implement a culture similar to DPR's in another organization, top leadership must adopt a people-focused view and illustrate that view to employees in ways that make sense for the specific organization.

CONCLUSION

DPR is an extremely active member of the IGLC community and is widely recognized and lauded for their implementation of lean construction. This paper examined DPR's culture and illustrated how DPR's culture maps to research in lean and culture theory. The authors argue that theory provides a roadmap of sorts, offering guidance on potential causal relationships and thus aiding in decision-making. DPR's foundational principles, specifically, align with so-called lean culture theory presented in the work of Collins and Liker. Moreover, this paper presented the foundational principles of DPR and highlighted how these support a company culture that embraces lean. DPR is a leader in lean construction, and while this is undoubtedly attributable to many factors, this paper presented a compelling case for culture being at least one such factor.

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