

Applying Taylor’s Principles to Teams: Renewing a Century-Old Theory

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In an effort to renew a century-old theory of management, Frederick Winslow Taylor’s Principles of Scientific Management were evaluated in the context of one of the newest forms of team structure, the integrated product team (IPT). A review of Taylor’s 1911 seminal work was compared against qualitative data collected at an organization that has recently adopted an IPT structure for several of its major projects. While the literature review and qualitative interview data regarding integrated product teams does not coincide with Taylor’s first principle, the remaining three principles hold some degree of applicability.

INTRODUCTION

When Frederick Winslow Taylor’s *The Principles of Scientific Management* was published in 1911, it was revolutionary and incited a great amount of public interest in the philosophy of scientific management (Davis & Blalack, 1975). In the last century, biographies (e.g., Copley, 1923), books (e.g., Wrege & Greenwood, 1991; Wren, 1998), and articles (e.g., Blake & Moseley, 2010; Butler, 1991; Cossette, 2002) addressing the significance of Taylor’s work have been published. Oftentimes, the Father of Scientific Management is praised for his work, but critics of “Taylorism” and the Taylor system have voiced their skepticism. In the prologue of his book, Kanigel (1997) describes how shortly after the publication of *The Principles of Scientific Management*, Taylor had to face intense scrutiny from his enemies, among them congressmen and influential labor leaders. In his 1912 Congressional testimony, Taylor was forced to defend his title as an efficiency expert and explain how his methods coincided with the best interests of the working man. More recently, Wrege and Hodgetts (2000) state that while “Frederick W. Taylor’s impact on management cannot be denied, whether his work always represented the use of science to solve management problems is questionable” (p. 1283) and found the conclusions of his pig iron experiments to be erroneous. Yet whether you commend Taylor for his contributions to the advancement of the science of management or condemn the revolutionary thinker for his unorthodox

methodology of getting men to work faster and more efficiently, we must step back and decide whether the work he did over 100 years ago, positive or negative, even holds any relevance in today's management world.

As the 100-year anniversary of the original publication of *The Principles of Scientific Management* was recently celebrated, researchers responded to the academic community's calls to reexamine Taylor's seminal work. In the past few years, several authors have published articles reflecting on the relevance and impact of his principles (e.g., Blake & Moseley, 2010; Taneja, Pryor, & Toombs, 2011). There are a variety of ways in which researchers can investigate whether the century-old theory is applicable to current management operations. For example, the quandary can be addressed and partially settled by examining some of the common practices and techniques utilized in present-day organizations. A current research and consulting endeavor has led our team of researchers to examine the implementation and functioning of one of the latest forms of team structure proliferating modern organizations, integrated product teams (IPTs). Our time spent reviewing the IPT literature and interviewing organizational members about IPTs, coupled with a recent read of *The Principles of Scientific Management*, led us to recognize that some of Taylor's principles and advice are relevant to this unique type of team structure.

Leonard and Freedman (2000) have offered their opinions on the relevance of scientific management to the functioning of organizational teams. With respect to production teams, the authors suggest that the team members themselves have the most knowledge concerning how their team should be organized, how the tasks should be accomplished, and which people should be included on the team, among other factors. Leonard and Freedman (2000) go on to explain that acknowledging that team members should be afforded the autonomy to make such decisions regarding the functioning of the team radically contradicts Taylor's philosophy that there is only one best way to perform a job, that time-and-motion study experts should identify and train employees to perform the job in this one best way, and that employee performance should be tightly monitored by management. Some of the literature that we have studied and the interviews that we have conducted regarding the implementation and functioning of integrated product teams in a real-world organization also stand in stark contradiction to some of the basic tenets of Taylor's management philosophy. As stated above however, we do believe that there are some elements of scientific management and a few words of wisdom from the Father of Scientific Management that can be used by modern day organizational leaders to assist in the more effective implementation and subsequent success of integrated product teams.

The Principles of Scientific Management

The culmination of decades of experimentation and research by Taylor and his colleagues led to four basic underlying principles: (1) the development of a science of the job with rigid rules and standardization for every motion of every man; (2) the careful and scientific selection and subsequent training of the workman to transform them into first-class men; (3) watchful management and paying each individual for working fast and doing exactly as they are told; (4) equal division of work and responsibility between the workman and management, with managers helping, encouraging, and smoothing the way for them (Taylor, 1911). Of the four principles, Taylor considered the first principle to be "the most interesting and spectacular" (p. 85). Ironically, we find this principle to be the one that is most contradictory to the implementation and functioning of integrated product teams. However, the interviews we conducted with senior management members revealed that the remaining three principles, if interpreted more broadly than perhaps Taylor intended, are applicable to the effective implementation and functioning of integrated product teams.

Integrated Product Teams

Definition and Purpose of Integrated Product Teams

The Department of Defense (DoD) defines integrated product teams (IPTs) as cross-functional teams that are assembled for the express purpose of delivering a product to a customer (US Department of Defense, 1996). The DoD guidelines also identify three success factors critical to IPT formation. To start, all functional disciplines that will be involved with any aspect of the product at any point during its

development life cycle need to be represented on the team. Second, all members must have a clear understanding of the team's goals and responsibilities and how authority is distributed should also be clearly understood. Finally, resource requirements, including staffing, funding, and facilities, must be determined (US Department of Defense, 1996). One scholarly publication documents the Boeing Company's definition of IPT, which explains that it is a cross-disciplined team that is collocated and whose members share responsibility through the design, manufacture, and service phases of the product (Poltrock & Engelbeck, 1999). Other nomenclature has been used to identify the basic structure that constitutes an integrated product team. Fleming and Koppelman (1996) note that the IPT concept has also been labeled multi-functional project teams and concurrent, parallel, or simultaneous engineering.

An Overview of the Research on Integrated Product Teams

The integrated product team (IPT) is a rather nascent organizational team structure and a relatively new focus of research efforts with the main body of literature on the topic being published in just the past decade. The body of literature on IPTs is rather limited. Those who have explored the topic and have conducted research have identified some crucial characteristics of effective IPT implementation and product development team building, including selection and training, compensation and rewards, and team leadership, which are addressed in more detail in the sections that follow (e.g., Dwivedi & Kumbakonam, 2002; Moore & Antill, 2001). These variables are addressed in separate sections due to the correspondence we believe they have with some of Taylor's principles.

There are a variety of other variables that regularly surface in the IPT literature and have been deemed critical to the effective functioning of an IPT. For example, Dwivedi and Kumbakonam (2002) discuss the importance of team cooperation to IPT success. A lack of cooperation is usually disruptive to the functioning of any team. In any type of cross-functional team structure, cooperation is an essential factor for positive team outcomes (e.g., McDonough, 2000).

Support from senior management is also an important factor in determining the success of an IPT (Dwivedi & Kumbakonam, 2002). The interest and backing of senior leaders in an organization should send the message that the work that IPT members do is valued by the company. Other researchers also stress the importance of management support to successful IPT functioning (e.g., Fleming & Koppelman, 1996).

Empowerment is an essential element to cross-functional (e.g., McDonough, 2000) and integrated project/product team success (e.g., Fleming & Koppelman, 1996; Moore & Antill, 2001; Valdez & Kleiner, 1996). IPT leaders should be empowered to select team members and have control over the budget and teams as a collective unit should have decision making authority (e.g., Fleming & Koppelman, 1996).

High degrees of collocation typically lead to higher levels of IPT performance. Research suggests that collocation is important for effective IPT performance (e.g., Moore & Antill, 2001; Poltrock & Engelbeck, 1999). Ideally, IPT members should work in close proximity to each other so that communication can flow much more readily.

As alluded to above, communication is extremely important to effective IPT functioning. Researchers suggest the need for effective communication in order to achieve successful team performance (e.g., Clark & Wheelwright, 1992; Griffin & Hauser, 1992; McDonough, 2000).

Commitment to the organization and the team are variables that will help maximize the benefits of integrated product/program teams (Winn, 2006). As researchers have stressed, commitment to the team is a vital element to team performance and success (e.g., Clark & Wheelwright, 1992; McDonough, 2000).

Finally, other researchers have focused on the advanced technology necessary to facilitate virtual collaboration (Bochenek & Ragusa, 2004) and virtual collocation (Poltrock & Engelbeck, 1999) when team members cannot meet in person. It is not uncommon for IPT members to serve on their teams from locations hundreds, even thousands, of miles away. This distance perpetuates a need to utilize advanced technologies to facilitate communication. Moore and Antill (2001) also concluded that information technology is necessary for IPTs to achieve their full potential.

IPT Research Applicable to Taylor's Principles

Principle 2: Careful Selection and Training for IPT Leaders and Members

Taylor's second principle states that workers, team leaders and members in the case of IPTs, should be selected carefully and scientifically and that subsequent training should be provided in order to transform them into first-class workers (i.e., team leaders and members). The IPT literature concurs that team leaders and members should not be selected haphazardly and training should be provided.

Selecting an effective IPT leader is extremely important to the ultimate success of the IPT. Product development team leaders are typically selected because of their personal leadership styles (e.g., Dwivedi & Kumbakonam, 2002) and the transformational leadership style appears to be a more effective style with respect to IPTs, as explained in the leadership style section below. Selecting the right members to serve on a team is also important. In IPT situations, team and functional leaders often negotiate with each other in order to select members for the team, focusing on the skills, training, and experience that will help potential members perform effectively on the team (e.g., Dwivedi & Kumbakonam, 2002). Motivation is also a crucial variable to consider when selecting team leaders and members. It is important to select team members who have the enthusiasm and willingness to participate in a team environment (Dwivedi & Kumbakonam, 2002). Rahman and Kumaraswamy (2005) conclude that team member attitudes and motivation are critical to successful collaboration on an integrated project team.

While selecting the most suitable leaders and members is a necessary precursor to team effectiveness, it is likely that some degree of training will be required in order to develop leaders and members to function to their fullest capacity. A variety of researchers have identified training for team leaders and members as a critical factor in effective team building and functioning (e.g., Dwivedi & Kumbakonam, 2002; Winn, 2006). In fact, Dwivedi and Kumbakonam (2002) state that team training is the most vital stage in effective team building and insufficient education and training of team members is a significant hurdle in the path to effective IPT performance (Valdez & Kleiner, 1996).

Principle 3: Paying for IPT Performance

The third of Taylor's principles calls for management to be watchful and for them to pay each individual for working fast and doing exactly as they are told. A narrow interpretation of this principle might suggest to the reader that employees should be micromanaged, that workers should be rewarded on an individual basis, that speed is the main criteria for reward, and that workers have no freedom to perform the job in a way that they see fit. A broader interpretation, and in the context of an IPT structure, the reader could view the principle differently.

Researchers suggest that senior managers should be involved with IPT implementation and provide necessary support (e.g., Fleming & Koppelman, 1996). This is not to suggest that these managers should micromanage the teams, but they should be watching carefully enough to recognize whether they are providing enough resources and support and to know when a team is performing at a level that deserves to be rewarded. With respect to rewards, the series of experiments that Taylor conducted observed jobs that were individual in nature (Taylor, 1911), so the rewards should have been strictly individually-based. In an IPT situation, team leaders and members are instructed to work as a cohesive team and told that they have the liberty to coordinate their efforts in the best way they see fit. Therefore, when the team carries out these orders and does exactly as they are told, the team should be rewarded accordingly. In order to develop any type of high-performance team, management must go beyond rewarding individual performance and utilize an evaluation and reward system that addresses team performance (e.g., Johnson, 1993; McClurg, 2001). The IPT literature concurs. The performance appraisal system and the pay raises that result from these appraisals need to be tied to components of team performance so that team members are encouraged to help each other rather than perform as individuals (e.g., Dwivedi & Kumbakonam, 2002). Offering only individual rewards, without recognizing team performance, is a significant barrier to the success of an IPT (Valdez & Kleiner, 1996). Finally with respect to rewarding for speed, one of the primary goals of an IPT is to increase efficiency and shorten product cycle time (e.g., Dwivedi & Kumbakonam, 2002; Fleming & Koppelman, 1996), so speed is an important element to IPT functioning.

Principle 4: Dividing Work and Responsibility--Effective IPT Leadership Style

The final scientific management principle suggests that management and the workman should equally share the workload and responsibility and that the managers should help, encourage, and smooth the way for the workers (Taylor, 1911). To interpret this principle in an IPT context, we can view the IPT leader as the “manager” who should share the work and pave the way for his or her respective team members.

Leadership is an extremely important factor to the successful implementation and functioning of nearly any type of team, including integrated product teams. Dwivedi and Kumbakonam (2002) suggest that the team leader is responsible for whether a project succeeds or fails. The authors further state that the leaders of such teams need to possess coaching, communication, and conflict resolution skills and be able to facilitate and influence members to achieve desired objectives, which coincides with Taylor’s advice for managers. Carman (2009) advises that IPT leaders should be skilled in interpersonal relations and possess the ability to listen, be patient, facilitate, coach, and communicate, which is also congruent with Taylor’s fourth principle. These types of skills and behaviors are consistent with many of the skills and behaviors of transformational leadership (Bass, 1990).

METHODOLOGY

Senior Management Interviews Regarding Integrated Product Teams

An organization with operations located in the state of Texas recently adopted an integrated product team (IPT) structure and hired our research team to conduct a study to evaluate the effectiveness of their IPT implementation effort and the functioning of the IPTs currently operating at the facility. A series of qualitative interviews were conducted with eleven members of senior management. Senior management members consisted of the president, chief financial officer, and vice presidents of all major divisions in the organization. All interviews were conducted onsite, in the private offices of each senior-level manager, and lasted approximately one hour each. A structured set of questions were used to facilitate the interviews. These questions were derived from our review of the IPT literature. The four members of the research team were present at all interviews and the team conferred after each interview in order to draw conclusions and arrive at a consensus regarding the responses to the interview questions. The series of interviews took place during the summer of 2010. The interviews with senior managers revealed some interesting perspectives that pertain to three of the four main principles of management identified by Taylor (1911). The research team also proposed recommendations that coincide with Taylor’s principles.

RESULTS

Based upon the literature review and interviews, the research team uncovered interesting results related to three of Taylor’s principles and drew the following conclusions with respect to the issues and inconsistencies limiting the effective creation and implementation of integrated product teams at the company. Several other conclusions were drawn and recommendations offered, but only the inferences and counsel related to Taylor’s principles of scientific management are included below.

Results Relating to Principle 2

Most members of the senior management team acknowledged that effective IPT leaders were a vital factor to successful IPT performance. However, most admitted that these leaders are not carefully selected based on their leadership qualities. Instead, they are typically chosen based on their technical expertise and past performance in their functional areas of expertise. Additionally, there is an insufficient effort in identifying and developing those at lower levels of the firm who have the skill sets needed for successful cross-functional leadership. If the organization desires to further the commitment to integrated product teams, more effort must be developed, directed, and coordinated toward carefully selecting and training IPT leaders.

Results Relating to Principle 3

There is inadequate support at the senior levels for integrated product teams. There is no champion for the change effort needed to successfully implement IPTs more broadly. Moreover, while management desires the efficiencies, quality, and cost controls that integrated product teams promise, and some customers demand, there are structural impediments that serve to undermine IPT leaders, primarily the fact that the organization is structured and operates in a very functional manner.

First, when IPT leaders are saddled with non-participating (or even unproductive) members that senior managers are unwilling to remove or discipline, IPT becomes nothing more than terminology. This is why most successful team leaders have at least some performance evaluation and financial authority.

Additionally, there are perceptions of the violation of distributive justice in this organization. Team members see uncooperative members rewarded functionally even if their participation with the IPT was less than stellar. This certainly impacts team morale. What also harms morale is the perception that unsuccessful team players and leaders are either promoted or simply moved elsewhere to another project so long as they are favored by the functional organization. The interviews revealed that this practice is allowed and even perpetuated by the most senior-level managers in the organization.

Results Relating to Principle 4

A lack of concern for organizational morale is inconsistent with a team-based approach and does not exemplify the helping and encouraging behavior that Taylor (1911) recommends. Generally, we think of morale as both an antecedent and an outcome of effective team processes. Yet, it appears that employee morale is an insignificant issue or, at best, the problem of the team leader who lacks the tools to address it. The organization has talent that wants to lead, but many feel like their hands are tied.

RECOMMENDATIONS

Recommendation Relating to Principle 1

The research team's first recommendation goes against Taylor's (1911) first principle. We encourage senior leaders to empower IPT leaders and grant them more control over the staffing, resources, evaluation, and budget of their respective IPTs. We spoke with a few IPT leaders that seemed to feel as if they did not have the power to lead their teams to the best of their abilities. One individual discussed the constraints put on his leadership due to the nature of a phased-funding budget. Another leader spoke of the lack of power to deal with problem team members that disrupt the team. The IPT leaders need to be more empowered in order to run their teams in the best way possible.

Recommendation Relating to Principle 2

The company should provide training for both IPT leaders and IPT members. The interviews that we conducted suggest that improvements could be made with respect to training both IPT leaders and members. Many of the individuals that lead and serve as members of these teams are very tactical in nature and highly effective in their functional areas of expertise. However, there are a variety of interpersonal components involved in effective team functioning so we believe leaders and members could benefit from training with respect to this team component and could then become more effective team leaders and members.

Recommendation Relating to Principle 3

Include a team-based component on IPT leader and member performance appraisals and provide team-based rewards for stellar IPT performance. Currently, the performance appraisal system that the company uses does not specifically evaluate IPT performance and the IPT leaders do not appear to have a great deal of say in the evaluations of their IPT members (at least this appears to be the perception among employees based on the interviews conducted). If team members do not believe that their team performance is important enough to be evaluated on their annual performance appraisal, they will be less likely to find it important to give their best effort in order to be an effective team member. When

performance is rewarded on an individual basis, teamwork often suffers. Collectively rewarding teams is a way to foster collaborative teamwork, increase cooperation, and improve the functioning of teams.

Additional Thoughts on Taylor's Potential Contributions to Organizations Utilizing IPTs

Taylor (1911) notes that behind the four principles of scientific management, and directing these principles, "there must be the optimistic, determined, and hard-working leader who can wait patiently as well as work" (p. 85). We find these to be extremely relevant words of wisdom for all organizations, regardless of the type of business or the structure of the organization. As applied to the information we have gathered regarding integrated product teams, we find this advice to be of the utmost importance. The IPT literature and the aggregate of our interview data identify skilled leaders as a vital key to the success of IPT implementation and functioning. Dwivedi and Kumbakonam (2002) suggest that team leaders should possess patience, confidence in themselves, effective communication and coaching skills, and the ability to resolve conflict.

CONCLUSION

Overall, it is evident that business leaders and strategists cannot apply, at least in a strict and narrow manner, all of Taylor's principles when trying to decipher the most effective way to implement and run integrated product teams. In the company that we investigated, thousands of employees perform a variety of extremely complex jobs in order to meet such customer demands as major airplane modifications and installations of high-tech surveillance systems. The level of complexity and the high degree of technology that the average employee at this organization is forced to contend with on a daily basis is a far cry from what the employees at Bethlehem Steel Company faced when they had to work at a specific and ideal pace while handling pig iron or decide what size shovel to use for ore versus rice coal. Not only are the jobs in the company we studied extremely complicated, but the team-based structure necessary to help the employees push a high quality product out the door in a more efficient manner is complex. Even when the Father of Scientific Management himself reflects upon the 30,000 to 50,000 carefully recorded experiments conducted at the Midvale Steel Company he admits that "It may seem preposterous to many people that it should have required a period of 26 years to investigate the effect of these twelve variables upon the cutting speed of metals" (Taylor, 1911, p. 109). Assuredly, organizations do not have the luxury of experimenting with IPTs for over a quarter of a decade in order to find the best way to implement them and make them work. We anticipate that in just a few short years a new and even more complex team structure will emerge and the concept of IPTs may be abandoned before we figure out how best to implement and utilize them. In the meantime however, we can broadly interpret the work of Frederick Winslow Taylor and use some of his advice to determine the best way to implement and sustain a high level of performance from IPTs. In the 100 years that have transpired since the publication of Taylor's seminal work, the primary goal of management, to reduce costs, has remained unchanged (Wrege & Hodgetts, 2000) and cost reduction is indeed one of the primary objectives of integrated product teams (e.g., Fleming & Koppelman, 1996; Moore & Antill, 2001).

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