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The Theoretical Foundations of Project Management

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Abstract: This paper constitutes a response to the oft-repeated claim that project management is a field without a theoretical foundation, an amalgam of *ad hoc* practices, and not a discrete academic discipline. Relying on scholarship from the 1920s to the present, the authors argue that project management has indeed a distinctive theoretical foundation, but one that is eclectic, and not unitary, which they identify as the real lack in project management theory. Essentially, Schley and Lewis argue that the essential elements of project management theory originate with Mary Parker Follet's lectures in the 1920s (delivered mostly before the London School of Economics) which identified such departures from classical management theory as lateral processes in organizations, and the authority of expertise in technical organizations. They then turn to the human relations school of management in the post-WWII era and the theoretical writings of scholars such as Elton Mayo, Kurt Lewin, Abraham Maslow, Chris Argyris, Douglas McGregor, the men of the socio-technical systems school of thought, Bertalanffy and his school of systems thinking, and point out that these radical theoretical departures from the classical, mechanistic model of organizational management forced the emergence of new approaches to management based on these theoretical breakthroughs, and that the most important of these was project management. Finally, the transformation of the American workforce by the GI Bill of Rights (1945) forced the development of new theoretical approaches to personnel and human resource management based on the new demographic realities of a workforce much more highly trained than in the earlier stages of industrialization.

Key words: project management; matrix; lateral processes; knowledge management; quality management; emerging management thought; conflict management; dynamic systems

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1. Introduction

During the ICAM conference in Nassau, The Bahamas, 2012, a presenter claimed that project management was a definite practice, but the discipline was lacking in theoretical grounding. As a project analyst since 1994, a practicing project manager since 1996, and a certified Project Management Professional since 2007, I was astounded, since I had been taught by an MIT engineer that project management has a definite theoretical grounding, and one that has been consciously enunciated since the mid-to late sixties, when the Project Management Institute was being formed. In response to my colleague's claim, however, I began delving into the literature and indeed, definitive and comprehensive statements of the theory of project management are lacking.

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One of the problems of an academic discipline that lacks adequate theoretical underpinnings is that other academics may question the legitimacy of the discipline altogether. Thus, a number of young project management scholars were forced recently to address this very issue, and concluded that:

> People have undertaken projects for more than 6,000 years, and projects are the key instrument for the development of society, starting from the pyramids and the Great Wall of China, and this is not going to change: people will keep undertaking projects, and it is our duty to our children and grandchildren to continue developing project management (Geraldi, Turner, Maylor, Soderholm, Hobday& Brady, 2008).

Thus, this paper attempts to address that lack.

2. Project Management Theory: The State of the Debate

Recent literature reveals a paucity of material dealing with project management theory, as the young scholar at ICAM claimed. Nonetheless, since 2007, at least six major efforts have been made: 1) J. Rodney Turner, in successive editorials in *The International Journal of Project Management* (*IJPM*, 2005-2006); 2) Sauer and Reich, in response, in the same journal (2006); 3) Christoph Bredillet, also in response in the same publication (2007-2008); 4) a second comprehensive effort by Rodney and several collaborators (J. Geraldi, H. Maylor, & T. Brady, 2008), also in *IJPM*; 5) a similar approach by Bastian Hanisch and Andreas Wald in the *Project Management Journal* (*PMJ*, 2011), and 6) an incisive treatment by Peter W. G. Morris in his new tome, *Reconstructing Project Management* (2013). These six major efforts show that at least some prominent figures and the two leading journals in project management are wrestling with the issue of the theoretical structure of the discipline.

2.1 Classical Management vs. Project Management

To begin this study, one must keep in mind that project management is not unlike classical management in that each arose in its modern technical form in response to certain particular demands of the business environment. In classical management, these demands came from the factory environment of the Industrial Revolution; in project management, these demands came from three separate fields: major construction projects, defense weapons systems development projects, and projects emanating from the field of high technology as a result of the Cold War.

Conversely, classical management and project management confronted two very different tasks from the very outset of their divergent beginnings. Therefore, each *required* a different form of management. Classical management was developed for the economic, demographic and market realities of a period (1750-1960), where product life cycles were long, work was primarily ongoing, low-level and repetitive, and workers were unskilled or semi-skilled and all-too-often displaced farm workers. Project management, on the other hand, confronted short-term, temporary undertakings, most often involving high-level design, engineering and technological challenges (whether in construction, defense or technology per se), and therefore requiring highly skilled, highly trained, and highly motivated workers. Both management disciplines thus relied from the outset on radically different understandings of organizational behavior and structures, and organizational dynamics and human resource management, including conflict management.

2.2 The Formation of Classical Management Theory

In dealing with the particular business and demographic paradigm facing them, classical managers had to do

what modern project managers have done — that is, they applied *ad hoc* solutions to the organizational and managerial problems they faced. Yet these managers were not content with *ad hoc* models, processes and structures. Thus they began very early (within eighty years of the emergence of the industrial revolution in England, ca. 1750) to think and write analytically about the new order they were building. Daniel Wren's masterpiece, *Early Management Thought* (1997), collects some of these writings in a systematic and detailed fashion. What came of this process during the discussion about management methods had, by the early 1900s, become a full-blown theory of organizational management, which was finally codified by the German political activist, jurist and scholar, Max Weber, in his monumental treatment of modern economic organizations, *Wirtschaft und Gesellschaft*, published posthumously by J. C. B. Mohr (Paul Siebeck) in 1922. This work was partially translated into English by the Harvard Sociologist, Talcott Parsons and published as *The Theory of Social and Economic Organization* in 1947. Whether in its complete German or abbreviated American form, this important work *defined* the theoretical underpinnings of classical management, though regrettably, as we move farther and farther from Weber's point in history, his work seems to serve as a justification for a form of extreme bureaucratization, rather than adhering to the mode of rational efficiency prescribed by Weber himself (1947/1964, p. 337). Because of the quality, persuasiveness, and rationality of Weber's synthesis, his work was almost universally accepted and it laid the definitive theoretical foundation for classical management — a foundation grounded in the new and unitary discipline of organizational sociology.

2.3 Weber's Theoretical Hierarchy

For Weber, the "bureaucracy" was not an actual demonstrable fact, so much as it was an *ideal type* comprised of certain necessary elements. The first distinguishing feature of a bureaucracy was that it offered a superior form of knowledge management, since it was made possible only by the role of technical knowledge in is formation and structure (1947/1964, pp. 337-339). The emerging importance of technical knowledge at the operational line and within the organizational unit advanced within the unit based on superiority of technical experience and knowledge, so that the top technocrat was far more likely to get his way in a dispute than the highly placed generalist (Weber, 1947/1964, p. 338). Mary Parker Follett (1940) would shortly develop her own observations on this subject far more deeply than Weber did. Conversely, Chester A. Barnard (1938), who borrowed heavily from Follett's work (*and without attribution!*), emphasized the key element of verticality in these organizations, and identified five vertical functions in classical organizations: planning, organizing, directing, controlling and staffing.

2.4 Vesting the Vertical Functions with Legitimate Authority

A second aspect of Weber's bureaucracy relied on a type of authority different from earlier forms operative in human societies. Traditional societies relied on what Weber called *traditional authority* (1947/1964, pp. 341-358), which comprised, among others, chieftains, patriarchs, gerontarchs or *elders*. In certain societies, such as American frontier settlements, one could also include the Roman Catholic priests and friars of the Southwest and the itinerant Protestant preachers, circuit riders and the like who provided spiritual authority in the nascent settlements prior to the establishment of an official legal and political order. Such men, especially within the "revival" movement, could also manifest *charismatic authority* (1947/1964, pp. 358-392), which inhered in persons as a "quality of an individual personality by virtue of which he is set apart from ordinary men and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers or qualities." (1947/1964, p. 358). He included here pagan shamans, Hebrew prophets, exceptional military leaders and others.

A modern bureaucracy abandoned these very deeply and socially grounded types of authority found in

pre-modern societies for a third type of authority — *legitimate authority*. Legitimate authority was *rational authority* grounded in law (in economic organizations, ultimately, in the power of the manager to hire and fire), and was thus to be distinguished from *traditional* (socially grounded) and *charismatic* (personally grounded) forms of authority — i.e., from *non-rational* forms or authority (1947/1964, p. 324). Legitimate authority had the advantage, moreover, that it inhered in the position, rather than the person, so required professionalism in organizational management, rather than personal subservience to a "boss" (which, for Weber, would equate to the traditional authority inherent in a "chief" or "chieftain").

Weber's analysis came out of a lifetime of study of sociological forms, and he can be credited with having founded the academic field of sociology. In addition, he leaned heavily on Kant's idealism, and claimed *not to be prescribing anything*, to be *describing* an ideal type, assembled from empirically describable parts. This ideal type, then, could be juxtaposed to individual bureaucratic structures to provide a standard of critique and correction.

Other elements came into Weber's idealized theoretical structure from other sources to give it greater definition. In the management of people and the flow of knowledge, organizations generally relied on unskilled and semi-skilled workers at the operational line. As education increased, however, so did the chances of a worker's advancement in the organization. The rising education through the levels of an organization justified the hierarchical structure and made it more efficient than other structures — especially in terms of knowledge management.

3. Platonic Idealism and the Distrust of Organizational Conflict

In communications management, classical organizational theorists and practitioners remained grounded in classical philosophic idealism and relied on Plato, supremely, but also Aristotle, for their theoretical assumption that all conflict was bad and led to diminution of productivity and performance (Rahim, 2011, p. 2). Classical management theorists all conceived of their organizations mechanistically. The machine model had actually been carried over from the Enlightenment scientists' development of orreys — mechanical clockwork models of the solar system. This machine model was then used to justify other key components of classical organizational theory. Key among these was the view that all conflict is detrimental to organizational operations. Thus, just as a knock within an engine indicates serious problems afoot that must be resolved before further harm occurs, organizational conflict had to be resolved before real damage had been done. consequently, out of their notion of the harmonious organization, organized and run along the lines of a smoothly functioning machine, the classical managers developed a single method for dealing with conflict — and this method was conflict resolution (Rahim, 2001, gives a brilliant exposition of the classical Western theoretical organizational assumptions behind the proliferation of the methodology of "conflict resolution").

3.1 The Influence of the Military Model

Henri Fayol (1925), a French engineer and organizational manager himself, was an older contemporary of both Weber, and the American engineer, Frederick Winslow Taylor (the father of "scientific management", 1911). Fayol's work paralleled and even influenced that of Weber. His singular contribution, however, was that he relied heavily on the military model of organizational structures (though earlier practitioners of classical management had done this from the beginning, since modern militaries offered the best examples of large, adaptable organizational structures). He even emphasized the scalar chain-of-command hierarchy (a concept criticized deeply, but to no avail, by Chris Argyris in his definitive work, *Personality and Organization*, 1957).

Essentially, Fayol laid out 14 principles of organizational management that became part of classical management. These were:

(1) *Division of work* (division of labor: originated in ancient Sumer; a basic characteristic of civilization).

(2) *Authority* (corresponds to Weber's "legitimate authority").

(3) *Discipline* (one of Sun Tzu's five virtues of leadership — intelligence, trustworthiness, humaneness, courage, sternness, or discipline; trans. Cleary, 1988, p. 45).

(4) *Unity of command* (the foundational principle of organizational management; contradicted by cross-function project teams and matrixed organizations).

(5)*Unity of direction* (contradicted by PM matrices).

(6) *Subordination of individual interests to the general interest* (corresponds to Weber's emphasis on replacing personalism with bureaucratic structure, policy, and legitimate authority).

(7) *Remuneration* (basis of the classical union principle — a fair day's work for a fair day's pay).

(8) *Centralization* (contradicted by Alfred P. Sloan, Jr. in his seminal work, *My Years with General Motors*, 1964, who stressed the necessary balance between centralization and decentralization, and the appropriate functions of each).

(9) *Scalar chain* (refuted by Argyris, 1957).

(10) *Order*.

(11) *Equity* (better: fair treatment of workers; corresponds to Sun Tzu's principle of "humaneness").

(12) *Stability of tenure of personnel* (tenure is a critical principle in bureaucracy and was adopted by Weber).

(13) *Initiative* (of employees at the operational level; when employees are allowed to originate and carry out plans, they will exert far higher levels of effort — McGregor reiterated this insight in his seminal work, *The Human Side of Enterprise*, 1960).

(14) *Esprit de corps* (Emphasized the promotion of "team spirit"…critical for PM; taken from Merrill, 1970, pp. 190-213).

This breakdown provides a fairly complete delineation of the principles of classical management. These stand in many cases in contrast to the principles of project management. For instance, where the classical manager relies on legitimate authority — the authority of position — project managers must rely on referential authority or even personal *charisma* to get the job done, since outside of projectized organizations and strong matrices (*PMBOK*, pp. 22-26), *they lack legitimate authority*. Where remuneration in classical management was based on pay for time (despite Taylor's efforts to establish and legitimate a piece-rate system!), project managers seek to pay for *deliverables*. Chris Argyris' psychological study of *Personality and Organization* (1957) demonstrated that in direct contradiction of claims made about the efficiency of the military scalar chain-of-command, this structure resulted in the progressive *infantilization* of personnel, because as one moved down the chain or command, the persons in the lower positions were progressively deprived of the decision-making authority to do their jobs. Moreover, while classical organizations rely on the principle of centralization — a trend driven today by increasingly powerful government bureaucracies demanding *compliance* with government directives and *policy* — project management recognizes the principle that the larger and more complex the project, the greater the decentralization must be!

Despite Fayol's reliance on the military model and the scalar chain-of-command, he also emphasized the necessity of resolving issues within the organization laterally, by putting the persons responsible at the same level in contact with one another, rather than going all the way up the chain and back down (Merrill, 1970, pp. 205-206).

Fayol called this the “gang-plank” method. In addition, Fayol recognized before his time, really, that when employees are allowed to originate and carry out plans, they will exert far higher levels of effort (a recognition brought to the fore by McGregor in 1960). In emphasizing lateral lines of communications, he presaged Mary Parker Follett’s in-depth treatment of lateral communications and cross-functional work within organizations, which she presented before the London School of Economics in the 1920s and termed “integrative unity” (Follett, ed. Graham, 1995, p. 195; Follett, ed. Metcalf and Urwick, 1940, pp. 82-94).

At this point in production and economic history, the bureaucratic hierarchy conceptualized by Weber and fleshed out by others such as Fayol, met the demands for command and control which were appropriate for static organizations operating in a fairly stable environment. That is, the classical management hierarchy was appropriate for the economic environment of the industrial economy.

4. The Transition: Mary Parker Follett

In this mix, Follett emerged as a transitional figure, working and advising within the structures described and advocated by Weber, Fayol and Taylor, yet setting the stage from remarkable breakthroughs in organizational theory and structures that were yet to come. Indeed, the theoretical underpinnings of the project management discipline go back to the 1920s, when Mary Parker Follett first identified the importance of lateral lines of communication, cross-functional processes, and the authority of technical expertise in hierarchical organizations (Follett, 1940; Follett & Graham, 1995, p. 195). Her identification of these important phenomena led immediately to the reconfiguration of the DuPont Corporation into the first matrix organization (since Mary Parker Follett was one of most well-regarded organizational consultants of the era, especially in the progressive Republican circles frequented by former President Theodore Roosevelt and the DuPont family of Delaware). The recognition and formalization of lateral lines of communication within hierarchical organizations constituted a major break with the classical management school, but it was not a formal break, only a portent of things to come. Today, however, these lateral processes are enshrined in none other than the *Guide to the Project Management Body of Knowledge* (*PMBOK*, 2011, pp. 22-26), and manifested in matrixed and in *networked* organizations.

4.1 Further Development of Project Management Theory: The American Defense and Technology Industries and the New Methodology

The real watershed of change, however, came in World War II, when the United States was caught well behind the curve of weapons development. This predicament forced the US to employ a completely new methodology catch up with and surpass the Axis powers as the war hung in the balance in 1942 and 1943. In this context, project management developed as an offshoot of operations research (Bredillet, 2007b) The operations research bent created, per Bredillet (2007c), the “optimization school” of project management thought, best embodied in Harold Kerzner’s massive, comprehensive text (first published in 1979 and now in its 11th edition!), *Project Management: A Systems Approach to Planning, Scheduling and Controlling* (2013). The optimization school was heavily influenced from two directions during this period — technical engineering and systems thinking, which first emerged from biology in the writings of Bertalanffy (1950), and culminated in his *opus magnus*, *General Systems Theory* (1968).

The optimization school led to the implementation of new project management processes and methodologies under the influence of the American defense establishment (Kerzner, 2013, pp. 38-39), in fulfillment of President Eisenhower’s directive to move from a conventional military footing to a technologically-oriented war-fighting

capability. This strategic shift toward technology and away from conventional arms included the creation and funding of NASA in 1957 through the leadership of Senate Majority Leader and later President Lyndon Baines Johnson. Eisenhower's directive was meant to outflank the Soviet Union's massive superiority in conventional land forces — infantry, artillery, and armor, and its implementation required the development of new and laterally-oriented methodologies for managing project work and scheduling. Under Admiral Hyman Rickover's leadership of the Polaris-Poseidon nuclear submarine program, defense contractors created and formalized fundamental modern project management methodologies: the Critical Path Method (CPM, or network diagramming), Project Evaluation and Review Technique (PERT) and Graphic Evaluation and Review Technique (GERT). All of these methods involved a holistic and lateral approach to project management processes and sub-processes, including the decomposition of complex work into manageable units (activities, tasks & work packages) in the form of the "Work Breakdown Structure" (WBS). In addition, CPM was modified to account for resource constraints, resulting in Critical Chain Method (CCM). Accordingly, project management, under the impetus of defense technology contracts, moved from the strictly linear and quasi-hierarchical "Gantt Charts" of the first quarter of the 20th century to work breakdown structures and network diagrams, which became the practical methodological tools developed and applied as a result of Follett's now fully accepted recognition of lateral processes in organizations.

5. Further Schools

As project management has grown as a discipline, its scions have followed divergent lines of thought. Bredillet, in fact, identifies nine actual schools of project management thought (2007b), and he delineates these chronologically as per their origins as follows: the optimization school (1940s), the modeling school (1950s), the governance school (1970s), the behavior school (1970s), the success school (1980s), the decision school (1980s), the process school (1980s), the contingency school (1990s), and the marketing school (1990s). On a parallel track, Hanisch and Wald (2011), have also found multiple "perspectives" and "influencing factors" when evaluating project management from a theoretical research perspective. And their analysis leads to an even more complex breakdown of PM as a discipline than does Bredillet's. Thus, Hanisch and Wald find three dimensions in project management research — Design, Context, and Goal. Each of these dimensions, in turn, is broken down into sub-dimensions: Design into Strategy and Structure, Project Management and Project Organization (Bredillet's "optimization school"), and Culture and Social Processes; Context into Complexity (chaos, systems and contingency theory), Dynamics (systems and contingency theory) and Uncertainty (contingency and game theory); and Goal into Value-Added and Adaptability (innovation management and management science).

Since the categories of Bredillet on the one hand, and the categories of Hanisch and Wald on the other overlap, the compelling conclusion is that *the theoretical foundations of project management are eclectic, and not unitary*. In this way, project management's theoretical underpinnings stand in sharp contrast to those of classical management, which originated almost wholly from organizational sociology (above, p. 3). Bredillet (2007b) points out, however, that project management theory is incomplete as well. It needs, for instance, a theory of "the very nature of projects" (2007b, p. 4) — although those of us who use the *PMBOK* may beg to differ on this question. The fundamental practical and theoretical divide between classical management and project management is that classical management involves the management of ongoing work, while project management concerns itself solely with temporary undertakings. Classical management and project management overlap,

however, in the area of change management, an area encompassed by Hanisch & Wald under several theories and disciplines, including contingency and systems theory, system dynamics and innovation management (2011, p. 16). Of more critical importance, however, is Bredillet's claim that "the legitimate epistemological foundations of project management as a knowledge field" must be argued (2007b, p. 5; Sauer C. & Reich B. H., 2007). Here the project management professional and scholar must delve more deeply and philosophically into the basic structure of knowledge embodied in project management.

5.1 The Theory of Constraints

Besides these more recent breakdowns of project management's theoretical structure, the modern project manager can follow the expansion and transformation of project management theory in the 1980s and 1990s with Eliyahu M. Goldratt's introduction of his theory of constraints (1984, 1997). Goldratt's twin works both dovetailed with and contextualized project management practice, based traditionally on a three-fold constraint (represented as a triangle): budget, schedule, performance specifications. Later, "resources" were inserted into the triangle in a central circle to denote a fourth constraint, and today one must consider "customer satisfaction" or acceptance of the project as a potential fifth constraint. In this respect, project management is indebted to the Total Quality Management movement (*PMBOK*, p. 229), another development within systems theory.

5.2 The Emergence of Conflict Management

Following on the acceptance of systems theory as providing the general framework in which project management was conducted, a third movement occurred, this one in the 1970s, which further undermined the theoretical foundations of classical management. This movement's impact was not indirect, as systems' management impact arguably was, but direct, as it struck at the core beliefs held by classical managers regarding the universally negative impacts of conflict on organizational performance. To wit, as the hard-core empiricists of the behaviorist school of conflict management began to kick around for new sacred cows to gore, they applied their already decidedly quantitative methodology to the oldest sacred cow of all in classical management — the 2400 year-old Western assumption that all conflict was detrimental to organizational goals and performance. These scholars, already obsessed with empirical data and results, were able to show by the middle-to-late 1970s that, to the contrary, conflict could have positive impacts on organizational performance (Rahim published his first edition of *Managing Conflict in Organizations* in 1978!). Some of these scholars even morphed into a new school of conflict management, the interactionists, who argued that organizational leaders needed to inject conflict into organizations in order to achieve optimal organizational performance (Verma, 1996). Alfred Sloan of General Motors Corporation (1929-1954) had been an intuitive interactionist in this sense, having built conflict into GM's structure naturally through the organization's cellular structure which incorporated the principles of "internal competition" (Sloan, 1964). Sloan also treated the critical issue of the balance of hierarchical functions and distributed functions in his classic, *My Years with General Motors* (1964, p. 429). Thus, in contrast to the classical management emphasis on the suppression or "resolution" of conflict, project management encourages healthy conflict that improves performance. This theoretical influence Bredillet (2007c, p. 3) accurately subsumes under his "Behavior School").

6. Synopsis of Project Management Theory

From these theoretical foundations, each embodying a breakthrough insight on its own, clear elements of project management theory emerged, and these elements distinguish project management clearly from classical

management. The first area of distinction is organizational theory. First, classical management assumes (going back to Frederick Winslow Taylor, Henry Fayol and Max Weber) the efficiency of vertical structures, precisely for the management of technical knowledge (Weber, 1947/1964). Conversely, project management recognizes the necessity and superior efficiency of lateral processes, and this recognition has come to be embodied in the widespread matrix organizations, and particularly in construction, in projectized organizations (*PMBOK*, pp. 22-26). In addition, while classical management has at its core five (5) *vertically* arranged "functions" — planning, organizing, directing, controlling and staffing — project management utilizes five *horizontally* ordered processes — initiating, planning, executing, monitoring and controlling, and closing (*PMBOK*, p. 61). Thus the practice of project management, whether it is done within a traditional hierarchical organization or within a modern, horizontally-oriented projectized organization, follows these five horizontal processes — because, from a theoretical standpoint, as well as from a practical standpoint, project management recognizes the superiority of lateral processes over vertical functions for completing projects successfully.

Project management similarly distances itself from mechanistically-conceived classical management structural models (based on Enlightenment and post-Enlightenment orreys embodying the machine paradigm). Instead, project management relies on more holistic, horizontally structured and integrated organizations influenced by Bertalanffy's systems theory (1968). Here project management incorporates elements of both Goldratt's theory of constraints (1984, 1997) and Deming's Total Quality Management (1982, 1993), a systems approach that includes knowledge management (*the system of profound knowledge*). A projectized organization thus operates in ways similar to the lateral orientations one finds in holistic and process-driven companies (such as San Francisco-based Patagonia, a maker of fine outerwear and sportswear for a high-end niche clientele, for instance, those who frequent Colorado's upscale ski resorts). And this mode of operation derives directly from the deep and determinative influence of systems theory on the discipline of project management.

The second area of theoretical distinction lies in human resource management. First, project management accepts the benefits of organizational conflict and does not focus primarily on "conflict resolution" as classical management did. Ideally, a project manager "manages conflict" to its optimal level to advance productivity within the organization (Verma, 1996; Rahim, 2001, 2011). Second, project management departs in its approach to human resources from the classical management approach of "mass production" in which complex work is broken down into smaller, simple and repeatable tasks to be carried out repetitively by large numbers of semi-literate, semi-skilled personnel. Instead, project management follows Pareto's Law, as applied to human resources, which is the 80-20 rule. That is, 80% of the work is done by 20% of the people. Project management therefore does not seek to accomplish work by throwing masses of unskilled and semi-skilled workers at a task, as was done during the industrial revolution and on projects of that era, notably, the US Transcontinental Railroad project. Rather, project management follows Pareto's Law to accomplish work with less expense and in shortened time frames by relying on a productive, highly trained minority. In this respect, the human resource theory of project management differs markedly from classical management, perhaps even more markedly than it does from classical management's organizational theory. Instead of recruiting masses of low-motivated, low-skilled workers and holding them to a low but uniform standard of productivity, project managers recruit highly skilled, highly motivated individuals to achieve quantum gains in performance. In this sense, project management is beholden to Douglas McGregor (1960), who saw that a humanistic approach to management could lead to quantum leaps in productivity, and to the GI Bill of Rights, which dramatically transformed the American workforce into the most highly educated in the World.

Indeed, McGregor's "Theory Y" has been widely adopted in the technical project management world, replacing the classical management theory of the expendability and interchangeability of personnel (derived from the Enlightenment's machine model of organizations, with the human beings as interchangeable parts — a theoretical supposition which also plays a key role in Weber's system, where authority vested in persons — traditional and charismatic — is replaced in his idealized structure with authority vested in position) — with a recognition of the irreplaceability of personnel. Project management's strong position in the technological sector means precisely that project management relies on highly skilled, technically trained persons to accomplish work, which reliance represents a complete departure from both the theory and practice of classical management.

Thus, billion-dollar defense projects follow key personnel, and project success is due to the acquisition of such personnel, not to the enlightened decision-making of executive management. In Federal defense contracting, where modern project management really began in the 40s and 50s, the ability of a company to win contracts is directly dependent on the presence of key personnel already acquired by the company. This fact means that companies, in order to compete in this arena, must identify and attract these key performers *prior to* placing their contract bids, which means that these persons must be paid before the certainty of an in-hand contract is at hand, and before funds have been disbursed. This modern project management approach stands in stark contrast to the classical management approach taken by the project managers of the great Depression-era projects, where men were considered absolutely replaceable. Frank Crowe amply demonstrated this assumption at Hoover Dam, and Strauss followed the same underlying conviction in the expendability of resources at the Golden Gate Bridge. Yet both were enormously successful projects, but both were executed within the theoretical framework of the classical management paradigm.

A third aspect of project management's differentiation from classical management from a human resources perspective is that PM is almost universally a team-based methodology, so that the soft skills of communication, team-building and conflict management come to the fore in project management performance. The fourth and final aspect of project management from a human resources management perspective is that project management rejects outright the theoretical claims about the benefits of static harmonious organizations and the detriments of conflict-driven organizations. Instead, project management embraces, in accordance with its holistic principles, a dynamic approach to organizational management, which prefers the methodologies of conflict management to those of conflict resolution.

Accordingly, project management theory emerged from classical management theory through breakthroughs in three areas of organizational theory. The first of these was the rejection of the assumption (going back to Weber and Fayol) that the organizational hierarchy was the most efficient organizational form. The critical piece was provided here by Mary Parker Follett in her recognition, publication and formal implementation of lateral processes in organizations. A secondary blow was delivered by Chris Argyris' ground-breaking work on the deficiencies of the organizational hierarchy, and particularly the scalar chain-of-command structure, in *Personality and Organization* (1957). Argyris went on to develop, in collaboration with Donald Schon (1974, 1978, 1982, 1995) the theory of learning organizations, a major intellectual and organizational breakthrough canonized in Peter Senge's definitive work, *The Fifth Discipline: The Art and Science of the Learning Organization* (1990). Bertalanffy's definitive work on systems theory (1950, 1968) undergirded these later developments. And lastly, the behaviorists' work on conflict management resulted in the recognition of the positive contributions of conflict to organizational performance, thus breaking away entirely from the main stem of classical management theory and its total reliance on the methodologies of "conflict resolution".

More generally, the emergence of Project Management as a distinctive management discipline was the cumulative result of several tides of theoretical changes in general management thought in the post-World-War II era. These included the human relations movement and its offshoots (including T-Groups), the quality movement, the introduction of psychology into management (by Elton Mayo (1933, 1945), Kurt Lewin (Kleiner, 1996), Abraham Maslow (1959, 1996), Chris Argyris (1957, 1982) and by Argyris with his colleague, Donald Schon (1974, 1978, 1995), Douglas McGregor (1960) and other scholars of note), socio-technical systems and other breakthroughs in intellectual and practical management that ran counter to and even undermined the theoretical claims, structures and methods of classical management (Kleiner, 1996). The great Stanford University electrical engineer, Willis Harman, who at the beginning of the sixties wrote some of the key texts in electrical engineering for the technology revolution, also made his contribution, but in the area of creative thinking as applied to the workplace. His work, in collaboration with John Horman, *Creative Work: The Constructive Role of Business in a Transforming Society* (1990) is one example of his contributions in this area.

Finally, project management arose at a later historical time and in different and more educationally and technologically advanced demographic and productive circumstances than did classical management. These different demographics and their concomitant demands on productive work are detailed by Dave Packard in *The HP Way* (1996). A key factor here was the GI Bill of Rights (1946) which provided American veterans of WWII with a government-paid college education. This one Federal act changed the face of the American work force forever, as men and women from humble, farming and industrial-class backgrounds flocked to colleges and especially state universities to become engineers and technicians of one sort or the other. Journalist Tom Brokaw has termed these men and women *The Greatest Generation* (1998). It was not just that these people became educated or brought the self-sacrifice of the war back into American life, however. It was that they made possible *a different type of production, a different approach to product and technological development, a different approach to human resource management, and on a different economic level and on a different organizational bases* than had ever been possible before. Kerzner gives special treatment in his work to the period 1945-1960 (2009, pp. 38-39). Kreitner & Kinicki (1998) have devoted an entire section to the management of creativity and creative personnel, and how to elicit creative decision-making from employees. None of these considerations would have made any sense at all within the theoretical framework of classical management, though Mary Parker Follett (1940; 1994) was aware of a developing trend in this direction (which is why Pauline C. Graham designates her a “Prophet of Management”!). Willis Harman and other collaborators (1990) have given special treatment to the role of personal creativity in the new and emerging management world of technology.

Accordingly, project management grew out of a different set of theoretical constructs and assumptions regarding necessary management practice that *for fundamental demographic reasons* had to be different from those with which the classical management theorists worked. Then, having evaluated and tested these constructs and assumptions, and formed them into definitive theories about how organizational management must be conducted in this new context, project management experts built their own praxis not *ad hoc*, but on an eclectically composed theoretical foundation. And this foundation, both by its content and by its vastly dissonant theoretical sources, differs markedly in its particulars — and in its outcomes — from those of classical management.

7. Deficiencies in This Treatment and Directions for Future Research

The greatest deficiency in this current treatment is that thus far, aside from the systems theory of the optimization school, we have no truly unitary, integrative principle for project management theory. Thus, the greatest direction for future research on the subject of the theoretical foundations of project management is the search for unifying theoretical element to draw these eclectic schools and influences together into a single coherent principle of project management. A key part of this effort, as Bredillet (2007b) has noted, is the quest for a definitive epistemology of project management. An ongoing problem in the discipline is the divergence between the American approach to project management, which follows an "execute-delivery" model, and the European approach, which argues forthrightly that every project begins with an idea that must be vetted (Morris, 2013). Another issue that requires a full analysis and response is the claim by Turner and Mueller (2003) that a project is a temporary organization to fulfill a specific production function.

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