Applying Knowledge Management Principles in Managing Projects

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By

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PREFACE

In an era where information is abundant yet often overwhelming, the pursuit of knowledge management has become more crucial than ever. This book, a culmination of years of research and practical application, examines the intricate processes of managing knowledge within organizations. At its core, the book emphasizes the knowledge hierarchy of data, information, and knowledge, extending it further to encompass wisdom. This progression—from data to wisdom—illustrates the ultimate goal of knowledge management: enabling individuals, teams, and organizations to make informed, exceptional decisions.

Dr. Vittal S. Anantatmula, a recognized authority on knowledge management, brings his extensive expertise and insight to this work. As a lifelong researcher, Dr. Anantatmula has dedicated his career to exploring the dynamics of knowledge creation, sharing, and utilization within organizations. His contributions have been widely acknowledged, earning him numerous accolades, including the 2019 ASEM Eschenbach Award for Best Engineering Management Journal paper and the University Scholar Award from Western Carolina University. His editorial leadership with the Project Management Journal and his participation in global academic initiatives further cement his status as a thought leader in this domain.

In this book, Dr. Anantatmula elucidates how data is transformed into information, information into knowledge, and knowledge into wisdom. By mastering this continuum, organizations can harness the full potential of their intellectual assets, fostering a culture of continuous improvement and strategic decision-making. This work is an invaluable resource for anyone looking to master the intricacies of knowledge management and apply wisdom strategically in today's project management environment.

As you read, you will explore the methodologies that underpin project management, highlighting the necessity of capturing lessons learned and integrating past experiences into current practices. It discusses the formalization of project management processes and the integration of knowledge management activities across all phases of a project. By leveraging organizational knowledge and institutional memory, project

managers can navigate uncertainties and make informed decisions that align with the strategic goals of the organization.

Meticulously crafted, this book provides a comprehensive guide for individuals, teams, and organizations, offering the tools and insights needed to tackle the challenges of contemporary project management. As you embark on this journey through the chapters ahead, I invite you to internalize the principles presented, apply the techniques discussed, and strive to transform your approach to project management. In doing so, you will not only enhance your own capabilities but also contribute to the collective wisdom of your team and organization, paving the way for sustained success in an increasingly complex world.

Dr. Tracey Richardson
Professor
Embry-Riddle Aeronautical University

FOREWORD

Much has been written about Project Management (PM) and Knowledge Management (KM) as separate disciplines. Each has been around for roughly the same amount of time. Marching mostly in parallel, each has made significant contributions to improving business performance, albeit while mostly situated within different parts of the same organizations. With that as a backdrop, one has to ask, "What would happen if we were to combine the best aspects of these two proven disciplines?"

Fortunately, WCU Professor Vittal Anantatmula at Western Carolina University has been pursuing that very idea and has been putting together a framework for PM/KM integration. That framework is now available.

Over the years, the project management community under the leadership of the Project Management Institute, of which Prof. Anantatmula is a member, has been practicing the basics of KM. Still, project management has barely scratched the surface when it comes to applying the full set of principles and practices that have been developed and refined by the KM community over the same period of time. Applying KM to PM and vice versa presents innumerable opportunities for synergies within and across both disciplines.

If you're a project manager, take a moment to think about the entire PM process, from project selection and planning through execution and closeout. How effectively and efficiently do you capture and transfer knowledge, especially critical, extremely valuable, but often deeply hidden tacit knowledge, from one step to another and from one project to another? Of course, knowledge is often shared informally. But how much better would future efforts be if you had a structured process in-place for capturing, sharing, applying, and growing that knowledge? Surely you would expect to benefit from fewer repeated mistakes and redundant efforts, not to mention an increased capacity for identifying and acting upon previously missed opportunities.

Drawing upon decades of experience, this book will show you how to smoothly and seamlessly integrate proven KM processes into your PM efforts. If you're a KM leader, manager, or practitioner, think about how proficient you currently are at managing yours and your clients' KM

initiatives. Regardless of your organization's maturity level, this book will help you advance progressively higher.

As professions, both PM and KM will likely remain in high demand for the foreseeable future. Think about how much more value you could produce and deliver by becoming an expert at integrating the two. This book will help you accomplish that, and much more.

Dr. Art Murray
CEO, Applied Knowledge Sciences, Inc.
Chief Fellow and co-Director
Enterprise of the Future Program
International Institute for Knowledge and Innovation

SUMMARY OF THE BOOK

In summary, Both PM and KM play a key role in improving organizational performance in delivering products or services better, faster, and cheaper. KM will lead to improved communication, improved productivity, better decision making, enhanced collaboration within a project team and across projects, and improved skills of project team members. Using KM with PM will lead to several benefits such as better project integration, reduced risk associated with unknown factors, and continuous improvement of project execution. KM will also help to distill new processes from previously executed projects.

The chapters of this book are primarily focused on integration of PM and KM in the context of plan-driven or traditional projects and Chapter 8 presents the integration for agile projects. The rest of the book is organized as detailed below.

Chapter One: This chapter introduces the definitions of knowledge, project, knowledge management and projects management. Further, the relations among all these concepts are explained to set a stage for integration of knowledge management with project management for improving project performance.

Chapter Two: This chapter will focus on project teams and project team performance. Relevant KM tools are discussed to improve the performance of traditional, agile, and global project teams. Integration of KM tools with these three types of project teams varies and a different approach for integration of KM and PM is necessary for agile, traditional, and global project teams.

Chapter Three: This chapter will address project selection, initiation, and high-level scope that will help an organization to decide whether the project will be executed internally or externally and if any part of the project work will be assigned to external agencies such as contractors. Project selection decision, initiation, and high-level scope require KM resources. Integration of KM and PM will immensely help project selection and initiation.

Chapter Four: This chapter will cover the development of a comprehensive project plan, which includes development of a detailed scope management plan that includes a WBS, resource management plan, cost management plan, schedule management plan, and risk management plan. Each plan demands learning from past projects, and this is where KM and KM tools become relevant.

Chapter Five: The project manager and the project team will have to deal with various key stakeholders of the project, and it is critical to determine the level of interest and influence these stakeholders exert on project plan, execution, and outcomes. A careful stakeholder analysis is a preliminary required step to identify all the key stakeholders and their impact on the project. Based on this analysis, a communication plan is developed to inform stakeholders about the project execution, progress, and challenges to manage changes to the project plan. Key stakeholders present an opportunity for collaborative learning and knowledge sharing.

Chapter Six: This chapter will focus on project execution wherein all the management plans under the umbrella of the comprehensive project plan will be implemented, monitored, and controlled. This project lifecycle is relevant for using KM, as many projects encounter the inadequacy of the plans in estimating and planning. Further, unforeseen changes are encountered during this phase. To deal with unexpected changes, deviations from the plans, and risks that were unanticipated, project managers often rely on past projects, knowledge repositories, document management systems, and data base systems. KM plays a crucial role in minimizing the impact of changes, unforeseen risks, and deviations for the original plans.

Chapter Seven: This chapter will cover project management processes and practices associated with the closing of the project. During this project phase, project management helps in capturing, documenting, and storing knowledge related to the project. The captured knowledge, and lessons learned contribute to knowledge management systems.

Chapter Eight: This chapter will discuss agile projects. Agility is the ability to move quickly and easily responding to changing customer desires, and is a need in the fast-pacing current global economy. An agile approach is a necessity, not an option. Creative and imaginative efforts of many led to the development of new approaches. Many projects in the current economy face a fluid situation and uncertainty that demands agility. Along with innovative approaches, creation of new knowledge and making best use of existing

knowledge are essential to managing agile projects. It is here that we recognize a perfect integration of KM and PM disciplines.

Chapter Nine: This chapter will cover the challenges associated with managing global projects. Global projects and global project teams present unique challenges. Specifically, global teams are often virtual in nature and face-to-face communication and nonverbal communication aids are largely absent. Communication, culture, and leadership assume importance in managing global projects. KM and communication are key aspects of global project teams.

CHAPTER ONE

INTRODUCTION

The continuous progression of civilization is a testimony to its ability to develop, learn, and share knowledge. However, we are experiencing a critical phase of our lives personally and professionally due to the explosion of information. How did we arrive here?

The answer lies in rapid advances in information and communication technologies. These technologies make it easy to develop, store, transfer, and share information. With the advent of the Internet, miniaturization of computers and access to information using computers, and advances in communication technologies, the global economy and free market philosophy have prospered. Never have markets and resources in any geographical region been so easily accessible. These developments led to paradigm shifts in managing businesses and marketing and providing services to people anywhere. Consequently, businesses are compelled to develop products and services faster, cheaper, and better to stay competitive locally, nationally, and globally.

Globalization, increasing international competition, and a free-market philosophy are the driving forces behind these advances in technology, and many organizations realized that the creation, transfer, and management of information and knowledge are critical for success in the current global economy. Organizations are attempting to use knowledge as one of the means to gain sustainable competitive advantage, and advances in technology are aiding these efforts.

With an explosive growth in population and increased interdependency of global market segments, and economies coupled with a steady decline of materials and energy resources, businesses and other organizations are compelled to make better use of resources effectively and efficiently. It is a perfect and compelling scenario for engaging knowledge sharing and learning practices.

Possessing knowledge also helps in developing strategies and making decisions for sustainable development and growth. Managing knowledge assumes a significant role in improving existing processes and developing new practices to utilize resources effectively and efficiently. Furthermore, knowledge assumes a critical role to stay competitive in this global economy and free market philosophy.

Knowledge is becoming a critical success factor for organizational performance. Organizations not only should learn, but learn fast, to survive and stay successful. It is in this context that effective knowledge management, project management, and integration of these two disciplines assume greater importance. Specifically, this book suggests the use of some of the knowledge management concepts and practices to improve projects and project management performance. To begin with the integration of knowledge management and project management, the purpose of the book, the concepts and common understanding of knowledge, knowledge management, projects, and project management are presented in this chapter. It is concluded with a note on how the rest of the book is organized, with a summary about each chapter.

What is Knowledge?

The purpose of knowledge is action, not knowledge.

- Aristotle

The term knowledge is used from the perspective of what you know. Knowledge encompasses facts, information, and skills acquired through experience or education. Knowledge is derived from thinking, and it is a combination of information, experience, and insight. Therefore, knowledge can be created by people. Knowledge can also be understood as "*the human capacity to take effective action in varied and uncertain situations."*[1] Knowledge is a resource that increases its value with use.

Some claim that AI can create knowledge. However, it is not that easy. Deriving knowledge from information requires human judgment and is based on context and experience. AI may present an analysis of an issue based on information available on the Internet worldwide, but we, people, can make sense of what is useful from this analysis and create a new

[1] Bennet & Bennet, 2004

knowledge. Information does not constitute knowledge, but it is, rather, a subset of knowledge.

The knowledge hierarchy is – data, information, and knowledge – which are often used interchangeably and in a similar vein. Data are facts, most commonly presented in numerical form and collected with an intent to refer to an issue. Data can be analyzed and organized into what we call "information." The resultant information, when it is used to solve a problem or understand an issue, becomes personal knowledge of the user of that information. In other words, information is a precursor to learning and transforming it into personal knowledge. When we make this personal knowledge explicit, it becomes an intellectual asset that can be shared. However, once it is shared, it becomes information for those who receive it.

We always know more than we can express and explain because we have knowledge that cannot necessarily be verbalized, as the knowledge is intuitive and unarticulated. This is known as *tacit knowledge*. We also have knowledge that can be verbalized, articulated, and documented, either in words or pictures, and it is known as *explicit knowledge*.

Tacit knowledge that lies within an organization may sometimes become an important factor of competitive advantage. It is because only a small fraction of an organization's knowledge is captured as explicit knowledge in the form of guidelines, policies, handbooks, forms, databases, and so on; these are formalized into documented practices, processes, and procedures for replication. The ownership of explicit organizational knowledge lies with the organization.

Table 1.1: Tacit vs. Explicit Knowledge

	Tacit	Explicit
Definition	Know-how, know-why: skills expressed through performance	Know-about: comprise facts, theories, and instructions
Quality, speed, cost of transfer	Slow, costly, and uncertain (high stickiness)	Fast, may be costly, accurate (low stickiness)
Diffusion	Difficult to convey	Easier to convey
Residence	General information, experiences, and memories	Books, documents, databases, policy manuals

Complexity	Relatively complex	Relatively simple
Teachability	Not teachable	Teachable
Observability	Not observable	Observable
Codifiability	Difficult	Easy

Source: Shem Sikombe et.al., 2019

The organization is at liberty to use its explicit knowledge to improve productivity and profitability. As tacit knowledge is the personal knowledge of an individual, an organization exercises less control over tacit knowledge. An important purpose of knowledge management is to tap into this tacit knowledge and make it explicit and easily accessible for everyone within the organization to achieve better business results. Possessing knowledge about a situation or an event and making use of it enables us to make better decisions and act more rationally.

Transformation of tacit knowledge to explicit knowledge, although to a limited extent, has been a source of productivity improvement. The productivity gains through conversion of tacit knowledge into explicit knowledge, and its subsequent repeated use on a global scale are fundamental to economic growth. Knowledge management discipline aims to transform tacit knowledge into explicit knowledge for productivity gains and improved profitability. Knowledge management also helps to create new knowledge. Ultimately, knowledge must transform into action and as such, making an informed and better decision. Artificial Intelligence (AI) applications are taking a step further in supporting decision-making.

Knowledge delivered using technology systems is available almost instantly and speeds up the decision-making process. For instance, in the stock market, a reduction in the lag between the time the knowledge is generated and the time it is available to all the interested parties helps investors in making informed and supposedly better decisions. From a knowledge perspective, the present economy distinguishes itself from earlier ones, due to the size of knowledge base, rapid pace of innovation, and the technological advances that facilitate information sharing and knowledge transfer.

Wisdom is an important outcome of gaining new knowledge. Wisdom is considered as the insight and the ability to recognize or judge what is true, right, or lasting. In other words, wisdom manifests in action as a result of sharing or gaining knowledge.

Knowledge Management (KM)

Although the terms knowledge and information are commonly used interchangeably, they have separate and distinct meanings in knowledge management. Information is the entity that gives quantitative, or even qualitative, form to our experiences in the form of language, numbers, pictures, and diagrams. Information allows us to communicate our basic observations and perceptions. On the other hand, knowledge is far more than information, because it includes the meaning and interpretation of the information.

Ironically, knowledge will remain dormant, and not very useful, until it is reflected in actions. KM is the systematic, explicit, and deliberate building, renewal and application of knowledge to optimize knowledge-related effectiveness of an organization thereby improving the performance and returns on knowledge assets.

The primary focus of KM is to make use of information technology and related tools such as AI, business processes, promising practices, and organizational culture to develop and share knowledge among people within an organization, and to connect those who possess knowledge to those who need the knowledge. Ultimately, knowledge management has a solitary purpose: to leverage knowledge for productive gains. Knowledge management should be used to solve business problems. Ultimately, it should be seen as a support system in achieving desired business results (Figure 1.1).

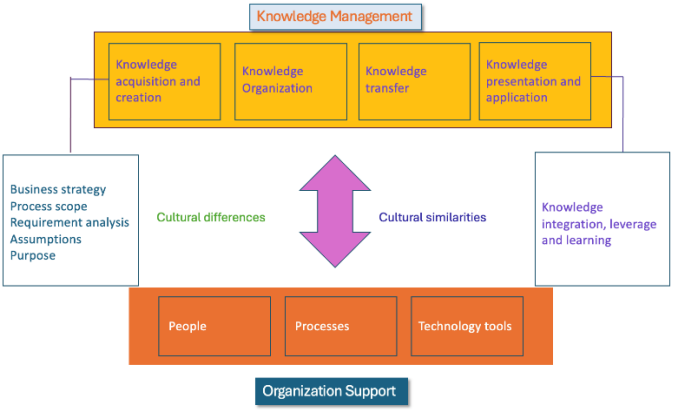

Figure 1.1: Knowledge Management in Organizations

Knowledge management deals with two activities; first, it is focused on maintaining and applying existing knowledge, and second, creating new knowledge. Existing knowledge includes both tacit and explicit knowledge that resides within organizations. Creating new knowledge involves a great deal of interaction among people within the organization. Consequently, two fundamental knowledge management activities emerge:

- Dissemination and application of existing knowledge in the organization.
- Creation of new knowledge and its conversion into new and improved processes and practices that lead to better products, services, and processes.

With a knowledge management system in place, both the decisions and selection of decision makers should be primarily based on knowledge. Better yet, decision-making must be delegated to people who possess the relevant tacit knowledge. With a focus on making the best use of knowledge, knowledge management can offer several benefits. Knowledge management is related to the wider discipline of management in the context of overlapping and developing harmonious relationships in activities such as learning and innovation, benchmarking and best practices, strategy, culture, and performance measurement.

Knowledge management uses both formal and informal organizational structures to accomplish the creation and dissemination of knowledge. To reap the benefits of knowledge management successfully, certain enabling factors such as leadership, culture, organizational structure, technology, and learning systems must be present.

Project

A project has a definite beginning, definite ending, and has several interdependent tasks. Unfamiliarity and uniqueness are also often described as characteristics of a project. A project is defined as a temporary endeavor to create a unique product, service, or result[2] . This definition uses the word "temporary," which sometimes conveys as being negative and having less importance. One must remember that "temporary" does not influence the length of the project duration as it can range from a few days to several years. Also, the definition does not introduce the concept of value and its contribution to an organization's strategic goals. Value can be tangible (e.g.,

[2] PMBOK®, 7t Ed., 2021.

cost savings) or intangible (e.g., increased brand equity). However, value is always associated with a benefit. A project must provide value to all its stakeholders; if not, a project will not receive adequate support.

Therefore, a project is defined as a new time-bound effort with several related and/or interdependent tasks to create a unique product or service that adds value. As it is a new effort, often we do not have complete knowledge or experience about planning and executing it. Projects are often characterized with uncertainty, unknown factors, and ambiguity, which delay the development of a detailed scope and specifications to later stages of project planning. It is here that knowledge management principles and practices can aid in planning and managing projects successfully.

Further, any project requires resources such as materials, tools, equipment, technology, and people to execute. Considering these additional facets of a project and to extend the definition of a project further, *a project can be considered as a complex, non-routine, one-time effort limited by time, budget, resources, and performance specifications designed to meet customer needs and add value to all key stakeholders*.

Projects are routinely planned and executed to accomplish strategic goals, which have broader impact on organizations. Projects are also the means to meet operational needs and improve operational efficiencies and effectiveness. Obviously, projects contribute to the operational and financial success of the organization. Consequently, project management is widely recognized as a critical competency for organizations to thrive in the present global economy.

From the perspective of for-profit organizations, projects are selected, planned, and executed to further their strategic objectives. These projects can be funded either internally or externally. For externally funded projects on behalf of clients outside of the organization, efficiency is how the profit is enhanced. However, if the organization is in the business of providing service, manufacturing, or research, most of the projects are probably funded internally, and these projects aim to create increased operational efficiency, new products, or new markets.

A nonprofit organization’s approach is different, and a project is executed either internally or externally to serve a social cause, and profit is not necessarily its primary purpose. However, in every type of organization, the underlying project management principles of effective and efficient use of

resources are still valid. This is where project performance and project management assume great importance.

Project Management (PM)

Formalized project management is concerned with completing a project on time, within budget, and according to the project specifications while satisfying both the customer and project team expectations. Project management is essentially the application of specific procedures, tools, and skills, in achieving the goals of the client, as reflected in the project objectives. In terms of presence, stature, and recognition, formalized project management is approaching the long-established professions such as engineering, law, and medicine.

Project management is concerned with completing a project on time, within budget, and according to the project specifications while satisfying both the customer and project team expectations. The underlying principle of project management is making use of resources effectively and efficiently as resources are limited and expensive.

Integration of KM and PM

From a historical perspective, neither the PM discipline nor the KM discipline can be considered new, including as evidenced by their recognition by professional societies, industrial organizations, and the academic community. PM has become an integral part of the business environment, through its evolution for centuries. Similarly, social, economic, and technological progress of any society is a testimony to KM practices through an age-old tradition of training, learning, education, and social activities.

PM is concerned with completing the project scope within the planned schedule, cost, and quality while meeting the expectations of key stakeholders. PM aims to use resources effectively and efficiently. KM, on the other hand, is a deliberate effort to develop knowledge in all specialty areas and share it throughout the enterprise. KM efforts will ultimately lead to better organizational performance in all operational and specialty areas.

From a learning perspective, the major distinction between individual learning and organizational learning is that the former normally uses tacit knowledge, while the latter always uses explicit knowledge. Employees

may develop optimum processes while performing tasks within the rules of the organization. On the other hand, organizations gain knowledge by documenting these processes, and by using these documents as references (Figure 1.2). Through replicating these processes, organizations acquire additional knowledge, which becomes independent of individuals who developed the original processes. Improving performance through learning is a common theme to a formalized approach to project management (PM) and knowledge management (KM), albeit KM focuses on knowledge in all areas beyond managing projects.

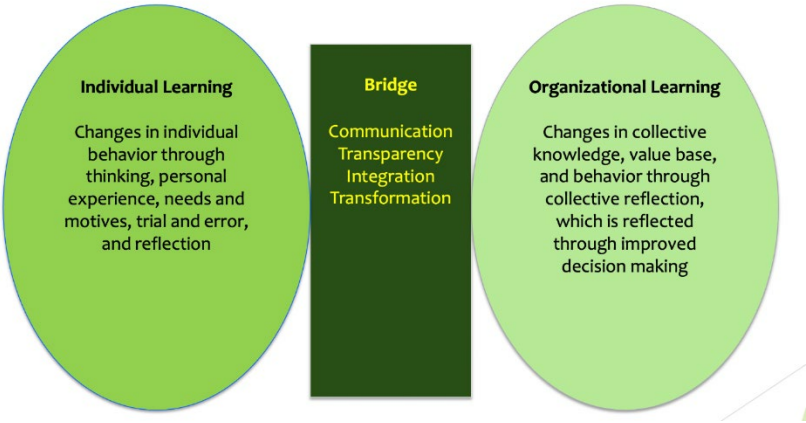

Figure 1.2: Individual vs. Organizational learning

Specifically, knowledge acquisition, development, transfer, and utilization are common functions to both. PM's focus is on improving project performance through improving the project management processes associated with all projects of the organization. KM's focus is on improving efficiency and effectiveness of all recognized and formalized disciplines throughout the enterprise. Notwithstanding, PM can be regarded as an integral part of KM as projects deal with new things, the development of which would require an appreciation of what is in existence and old.

Characteristics of a project and knowledge are different. However, integration of these entities leads to productivity gains as they complement each other.

- A project has performance focus; it is new by definition and is associated with a change in behavior. A project is primarily associated with plan, execution and control activities.
- Knowledge has innovation focus; it is associated with learning something new, and new learning leads to changes in behavior. Knowledge is primarily associated with systems thinking.

Project performance obviously influences an organization's sustainable development, profitability, and growth. This requires a broad view of completing a project on target to improving project management performance for enhancing performance of future projects. In other words, organizations must learn from past projects.

It is equally important to establish a continuous improvement plan to enhance project performance. Learning from the past, sharing knowledge, and then improving project management practices and processes on a regular basis are what many sophisticated organizations do. This is where applying knowledge management principles for continual learning, and improving project performance, gains recognition and importance.

Ultimately, this approach should lead to higher profits and setting industry standards for project performance. This is possible with maturity in managing projects. Maturity in managing projects implies established, proven, and innovative practices and procedures that lead to success in planning, executing, and completing projects repeatedly. Given that organizational project management maturity leads to better profits through efficiency in operations and effectiveness in using resources, organizations are encouraged to promote, measure, and improve project management performance. Obviously, KM plays a key role in organizational project management maturity.

In general, projects are managed in a complex work environment for two reasons: first, each project is unique, and second, conditions for team selection and motivation are often far from ideal. Uniqueness contributes to issues such as unknowns, uncertainties, technical complexity, and risk. Bringing together a group of people to collaborate for a cohesive effort presents many people-related challenges such as interpersonal relations, conflicts, and behavioural issues. In addition to uniqueness and complexity, unfamiliarity is often described as one of the characteristics of projects and as a result, projects are often associated with change and risk. Consequently, strong leadership, that provides vision and ability to cope with change, is a

must for successful project performance. Further, a project's uniqueness contributes to issues such as unknowns, uncertainties, technical complexity, and risk, and this is where integration of KM principles and tools provides immense value to managing projects successfully.

Integrated approach to KM and PM

As discussed earlier, PM's focus is on improving project performance through improving the processes associated with projects of the organization. On the other hand, KM's focus is on improving efficiency and effectiveness of all recognized formalized disciplines throughout the enterprise.

Improving performance through learning is a common theme to formalized project management (PM) and knowledge management (KM), albeit KM focuses on knowledge in all areas including projects. Specifically, knowledge acquisition, development, transfer, and utilization are common functions to both disciplines.

Research has shown that KM leads to improved communication and enhanced collaboration. Furthermore, enhanced collaboration leverages employee skills in the context of decision-making to influence productivity and quality. KM, therefore, improves decision-making and productivity internally, and customer satisfaction externally. It is reasonable to expect that effective integration of KM and PM would result in all these benefits.

However, the influence of KM at the organizational level is much broader. As discussed earlier, external forces such as the global economy and free market philosophy are compelling organizations to learn, innovate, and develop services faster, cheaper, and better. Internally, people in the organization are inherently motivated to work hard and learn to improve their performance with the realization that customer satisfaction further strengthens their desire to learn and perform better. Information and communication technologies (ICT) channel these external and internal driving forces to create and share knowledge that enhances learning in the organization. Knowledge creation and dissemination are interrelated with each other in ways that transform an organization into a learning organization (Figure 1.3).

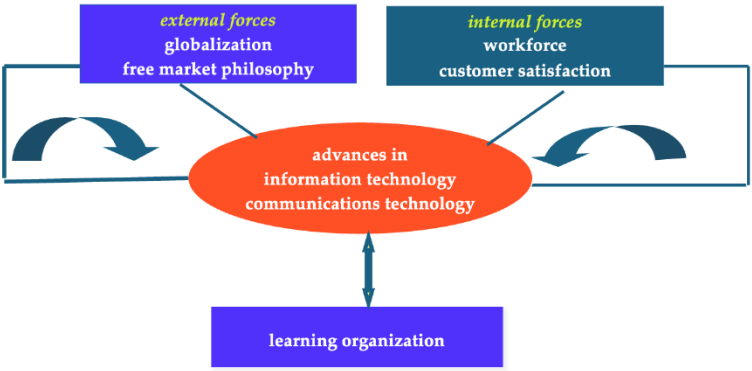

Figure 1.3: Learning Organization

Technology helps design PM tools for planning and web-based support systems, which are essential for managing soft issues such as communication, conflict resolution, and knowledge sharing. The use of sophisticated PM tools, driven by factors such as project complexities and diverse cultures requiring new management skills, will have a profound impact on project leadership. Furthermore, methods of communication, decision making, soliciting commitment, and risk sharing facilitate a shift in management style to a team-centered and self-directed form of project control. In essence, KM helps project teams to transform into self-managed teams.

Technology, in the context of KM, is essential to support this shift to participative management and the leadership of projects. Integrating PM and KM technology tools at every phase of the project management life cycle is desirable for both traditional, virtual, and agile project teams (Figure 1.4).

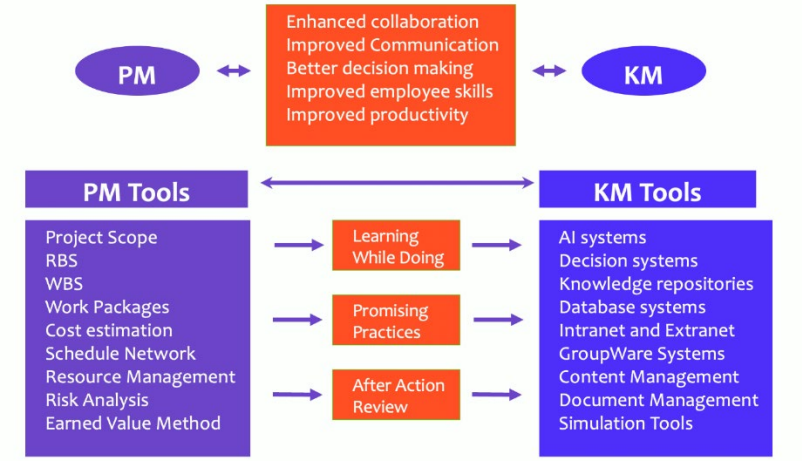

Figure 1.4: Integration of PM and KM tools and technology

Project managers can employ KM technology tools to capture data and information and facilitate knowledge development and transfer. Historical project performance data can feed back into data repositories and database systems, and the result is a fluid knowledge flow between project management processes and technology tools.

PM uses technology such as statistical modeling tools for estimating, project portfolio selection models, risk analysis schemas, and PM software, to plan, execute, monitor, analyze, and control, project performance. If a full scale project management office (PMO) is in place, then organizational project management is likely to use Intranet, Internet, video-conferencing, knowledge repositories, expert database systems, artificial intelligence tools, and electronic yellow pages, to capture tacit and explicit knowledge of individuals in the organization and to integrate with organizational explicit knowledge. Again, the distinction is that KM's application and scope of these tools go well beyond managing projects.

While individual learning is similar in PM and KM, they adopt different approaches to organizational learning. PMO formalizes organizational learning for PM through several means and processes with a focus on improving project performance whereas KM focuses on improving organizational performance by employing technology tools and social networks within an organization. Project managers can achieve a level of

continuous improvement in project performance by applying KM technology tools throughout the project management life cycle:

- Selection of projects using knowledge-based decision systems.
- Development of resource breakdown structure (RBS) and keeping it current with resource cost information from recently concluded projects.
- Development of project plans and scope with the help of project repositories.
- Estimation of project costs using historical data and earned value analysis.
- Development of work breakdown structure (WBS) using database systems.
- Development of the project schedule using historical data and lessons learned.
- Management of resources using actual resource usage data from similar projects.

Technology facilitates interaction among the project team members, encourages discussions, and promotes the flow and collection of knowledge. Technology, specifically KM, promotes communication, employee skills, collaboration, decision making, and productivity. Consequently, technology (IT and KM) helps project leaders improve project performance, promote team development, and competency.

Integrating KM with PM will lead to several benefits such as better project integration, improved and effective project planning, reduced risk associated with unknown and uncertain factors, and continuous improvement of project execution. KM would also help to distill new processes from previously executed projects. Integration of KM with PM is necessary as projects are unique and prior knowledge or experience does not exist for many projects. Further, an approach to managing a project and project outcomes vary for each project. Consequently, trade-offs among cost, scope, time, and quality present new challenges in every project, compelling project management teams to acquire and share knowledge and to develop innovative approaches.

However, integration of PM and KM will not be free. The PM and KM integration will cost minimal if an organization has PMO in place and PMO assumes the role of knowledge management. However, in some cases, if a few KM systems will have to be updated. If an organization does not have a PMO but KM systems are in place, the cost would be marginal as most of

the costs associated with KM systems would be considered as sunk costs. In the third scenario where both PMO and KM are absent in an organization, the cost for PM-KM integration would be equivalent to the costs associated with setting up KM or PMO in place.

As indicated in Figure 1.4, KM helps organizations to enhance collaboration and improve communication among employees resulting in knowledge sharing. Consequently, better decisions are made with relevant information available. Further, employee skills and productivity are likely to improve through knowledge sharing. With these outcomes of managing knowledge effectively, PM will improve along with individual processes and practices associated with project planning and execution. This integration of PM and KM can be formalized using various KM tools such as communities of practice, database systems and knowledge repositories.

Figure 1.4 also presents a dynamic integration model of KM and PM. Simultaneously applying and integrating KM and PM tools would provide updated information and knowledge for managing projects better. These goals will be achieved by reinforcing promising practices and reviewing actions during and after completing a project. In turn, the project performance data from various segments of the project will feed back into knowledge data repositories, and database systems. The resulting continuous loop provides an opportunity for fluid knowledge flow between PM and KM systems thereby facilitating learning. For example, the project execution phase will provide actual data about resource utilization, individual and collective resource efforts required for different tasks, associated costs, and the performance of each resource. In turn, these data will be of immense value in refining and improving resource breakdown structure (RBS) and skill levels.

The model shown in Figure 1.4 suggests dynamic interaction between KM and PM throughout the project management lifecycle. It suggests continuous transformation of tacit knowledge to explicit knowledge and vice versa. Some of the KM tools such as intranets, video conferencing, and electronic yellow pages of experts would support the project execution phase by enhancing collaboration, and by improving communication among the project team members. Extensive team interaction almost always results in improved employee skills and productivity. These tools would also improve team participation and decision making. Intranets can be used to document achievements and lessons learned daily. Video conferencing tools can be used to tap into the expertise and knowledge of people within

the organization but in different locations. Likewise, electronic yellow pages can be used to seek expert advice for all phases of project planning and execution.

A classic example of integrating PM and KM would be reflected in developing a PM software that shifts its traditional focus on quantitative aspects of PM to both qualitative and quantitative aspects. For example, day-to-day learning of project team members and decision making can also be an integral part of PM software. Ultimately, dynamic project planning based on learning while executing projects is an important result of improving PM performance through KM. Project integration, which promotes unity of effort in projects by integrating all project-related knowledge, can be achieved by applying this model.

Both KM and PM engage in acquisition, creation, transfer, retention, sharing, and utilization, of knowledge. PMO plays an important role in accomplishing these knowledge-related activities. It is increasingly becoming noticeable that organizations need PMO to improve the overall and consistent performance of projects. While a formal structure (PMO) manages PM knowledge, KM uses other organizational entities and other systems and processes for these purposes.

Given that both PM and KM efforts require investment, the organization would anticipate tangible results from their efforts. While the size of a project determines the resources and investment needed for a project, investment in PMO within an organization depends on the goals of project performance excellence set by the organization. Likewise, the specific objectives of the KM system will determine its investment needs. KM and PM disciplines have their own sets of processes, whose implementation will require changes to their existing policies and procedures. For successful implementation of PM and KM, organizations need to make changes in policies, practices, and procedures, train people at all levels, and make changes to accounting procedures. While PM demands project-based finance and cost control mechanisms, KM will facilitate innovative cost measuring concepts, such as those recognizing the intangible assets represented by intellectual capital.

By definition, projects are new entities, and all new things are associated with change. Successful implementation of projects would lead to changes, such as modified organizational processes and new products. In turn, these changes might trigger changes in marketing and business strategies, in

building new facilities, in work functions, and in business related technologies. Likewise, learning associated with KM will lead to changes in management functions, processes, work functions and behaviour of people.

In summary, Both PM and KM play a key role in improving organizational performance in delivering products or services better, faster, and cheaper. KM will lead to improved communication, improved productivity, better decision making, enhanced collaboration within a project team and across projects, and improved skills of project team members. Using KM with PM will lead to several benefits such as better project integration, reduced risk associated with unknown factors, and continuous improvement of project execution. KM will also help to distill new processes from previously executed projects.

The remaining chapters of this book are primarily focused on integration of PM and KM in the context of plan-driven or traditional projects and Chapter 8 presents the integration for agile projects. The rest of the book is organized as detailed below.

Chapter Two: This chapter will focus on project teams and project team performance. Relevant KM tools are discussed to improve the performance of traditional, agile, and global project teams. Integration of KM tools with these three types of project teams varies and a different approach for integration of KM and PM is necessary for agile, traditional, and global project teams.

Chapter Three: This chapter will address project selection, initiation, and high-level scope that will help an organization to decide whether the project will be executed internally or externally and if any part of the project work will be assigned to external agencies such as contractors. Project selection decision, initiation, and high-level scope require KM resources. Integration of KM and PM will immensely help project selection and initiation.

Chapter Four: This chapter will cover the development of a comprehensive project plan, which includes development of a detailed scope management plan that includes a WBS, resource management plan, cost management plan, schedule management plan, and risk management plan. Each plan demands learning from past projects, and this is where KM and KM tools become relevant.

Chapter Five: The project manager and the project team will have to deal with various key stakeholders of the project, and it is critical to determine the level of interest and influence these stakeholders exert on project plan, execution, and outcomes. A careful stakeholder analysis is a preliminary, required step to identify all the key stakeholders and their impact on the project. Based on this analysis, a communication plan is developed to inform stakeholders about the project execution, progress, and challenges to manage changes to the project plan. Key stakeholders present an opportunity for collaborative learning and knowledge sharing.

Chapter Six: This chapter will focus on project execution wherein all the management plans under the umbrella of the comprehensive project plan will be implemented, monitored, and controlled. This project lifecycle is relevant for using KM, as many projects encounter the inadequacy of the plans in estimating and planning. Further, unforeseen changes are encountered during this phase. To deal with unexpected changes, deviations from the plans, and risks that were unanticipated, project managers often rely on past projects, knowledge repositories, document management systems, and data base systems. KM plays a crucial role in minimizing the impact of changes, unforeseen risks, and deviations for the original plans.

Chapter Seven: This chapter will cover project management processes and practices associated with the closing of the project. During this project phase, project management helps in capturing, documenting, and storing knowledge related to the project. The captured knowledge, and lessons learned contribute to knowledge management systems.

Chapter Eight: This chapter will discuss agile projects. Agility is the ability to move quickly and easily responding to changing customer desires. And agility is a need in the fast-pacing current global economy. An agile approach is a necessity, not an option. Creative and imaginative efforts of many led to the development of new approaches. Many projects in the current economy face a fluid situation and uncertainty that demands agility. Along with innovative approaches, creation of new knowledge and making best use of existing knowledge are essential to managing agile projects. It is here that we recognize a perfect integration of KM and PM disciplines.

Chapter Nine: This chapter will cover challenges associated with managing global projects. Global projects and global project teams present unique challenges. Specifically, global teams are often virtual in nature and face-to-face communication and nonverbal communication aids are largely