La gestion des projets de mise en œuvre
des systèmes ERP en milieu universitaire

par

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Sommaire

La présente étude porte sur la gestion des projets de mise en œuvre des systèmes ERP en milieu universitaire. Les systèmes ERP, ou progiciels de gestion intégrée, sont des systèmes informatiques qui tendent à unifier dans une certaine mesure la gestion des activités d'une organisation. Initialement conçus pour le milieu industriel, ces systèmes ont conquis d'autres organisations telles que les administrations publiques et les institutions académiques. Un nombre de plus en plus croissant d'universités se tourne vers les systèmes ERP pour remplacer des systèmes informatiques hétéroclites et vieillissants. Mais cette transition vers les systèmes ERP ne se fait pas sans accroc, comme en témoigne le taux d'échec élevé au niveau de la mise en œuvre de ces systèmes. En effet, l'espace du projet ERP est un environnement d'une extrême complexité qui comprend divers acteurs, diverses technologies et diverses données. Cette complexité représente un défi du point de vue de la gestion du projet de mise en œuvre. La présente thèse analyse la fonction de gestion des projets ERP en milieu universitaire sous trois angles : (i) les défis et les problèmes liés à la mise en œuvre ; (ii) les tactiques d'acquisition et de gestion des ressources humaines ; (iii) le parrainage du projet par un administrateur de l'institution. L'étude a pour objectif d'analyser la gestion de projet en milieu universitaire sous les angles mentionnés ci-dessus afin de faire des suggestions dans le sens de l'amélioration de la gestion de projet.

La thèse qui s'est appuyée sur treize projets a permis de collecter des données, de les analyser et de pouvoir relever les aspects positifs et les défis de la gestion des projets ERP afin de tirer des leçons, de faire des suggestions pouvant contribuer à améliorer la gestion des projets ERP en milieu universitaire. À travers l'article (i), l'auteur a analysé les défis majeurs --du point de vue du chef de projet-- dans le cadre de chaque projet et l'impact de ces défis sur le processus de mise en œuvre du projet. Cela a permis de dégager des leçons pouvant contribuer à la sélection, à la formation de futurs chefs de projet, à la planification et à la

gestion d'autres projets dans le futur. L'article (ii) a donné l'occasion d'analyser les questions liées à l'acquisition et à la gestion des ressources humaines dans le cadre des projets ERP en milieu universitaire. Cette étude a permis de relever les stratégies d'acquisition de ces ressources humaines, les difficultés inhérentes à cette activité et la gestion quotidienne de ces ressources. À travers l'article (iii), l'auteur a analysé le concept et le rôle du parrainage du projet (par un administrateur de l'institution) afin d'en apprécier l'opportunité et la portée sur la réussite du projet. Les leçons tirées de cette étude permettent de traiter cet aspect du projet ERP dans le cadre d'autres projets dans le futur. La présente thèse représente une contribution à la gestion des projets ERP de façon générale et plus particulièrement à la mise en œuvre des projets en milieu universitaire.

Remerciements

La contribution de plusieurs personnes physiques et morales m'a permis de mener à bien cette thèse de doctorat. Je prie l'ensemble de ces personnes de bien vouloir trouver ici l'expression de ma profonde gratitude.

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Table des matières

Liste des abréviations

CMMI   Capability Maturity Model Integration

CSF   Critical Success Factor

PM   Project Manager

PMBOK   Project Management Body of Knowledge

Liste des tableaux

Introduction

Contexte

Cette thèse porte sur *la gestion des projets de mise en œuvre des systèmes ERP en milieu universitaire*. L'acronyme ERP désigne *Enterprise Resource Planning* en anglais. Les systèmes ERP sont des systèmes d'information de gestion intégrant et automatisant les opérations d'une entreprise. Initialement conçus pour le milieu manufacturier, avec les *Materials Requirements Planning*, (MRP) et *Manufacturing Resource Planning II*, (MRP II), les systèmes ERP visent à intégrer et à automatiser les opérations d'approvisionnement, de production, de gestion de la production, de gestion financière et administrative et des opérations de distribution au niveau des entreprises. Les systèmes ERP sont sortis de leur cadre manufacturier pour s'étendre à d'autres secteurs d'activités comme les entreprises non manufacturières, les administrations publiques et les institutions académiques. Dans ces milieux, les systèmes ERP sont des outils de gestion comptable et financière, de gestion administrative, de gestion des ressources humaines, de gestion de la clientèle et de gestion de certains aspects spécifiques de chacune de ces organisations.

Les universités sont devenues de grandes consommatrices de systèmes informatiques de plus en plus complexes utilisés pour gérer de façon intégrée différentes activités de ces institutions. De façon générale, l'université acquiert le système ERP auprès d'un fournisseur extérieur. La mise en œuvre de ces systèmes de plus en plus complexes sollicite l'intervention de plusieurs acteurs tels que les départements académiques, l'administration de l'université, le service informatique de l'université et le fournisseur extérieur du système ERP.

Le projet ERP est un projet gigantesque et onéreux qui s'inscrit dans le temps aussi bien au niveau de la mise en œuvre que de l'exploitation. Ce projet comprend, entre autres,

les phases suivantes : l'évaluation des besoins, l'étude de faisabilité, la mise en place d'une équipe de projet, la sélection d'un fournisseur extérieur du système ERP, la mise en œuvre proprement dite et les activités d'exploitation. La complexité de la mise en œuvre du système est source de difficultés. Les difficultés elles-mêmes sont sources d'un taux d'échec élevé au niveau de ces mises en œuvre. Le besoin de comprendre et de contribuer à faciliter la gestion de cet environnement complexe met en relief la nécessité de faire de la recherche sur ce sujet.

L'auteur de la présente thèse a choisi d'étudier ce sujet pour diverses raisons. D'abord, dans le cadre de ses activités professionnelles, il a été exposé à la mise en œuvre des systèmes ERP en milieu universitaire. Cela lui a permis de prendre conscience des besoins et des difficultés dans le domaine et cela a suscité en lui la volonté de mener des recherches en vue de contribuer à résoudre les problèmes. Par ailleurs, une analyse préliminaire du domaine a permis de constater que, malgré l'abondance de la littérature sur les systèmes ERP, il n'y pas assez d'études sur la mise en œuvre des systèmes ERP en milieu universitaire. La plupart des communications portant sur les systèmes ERP en milieu universitaire sont des comptes-rendus de projet. En général, le chef du projet ou une personnalité de premier plan ayant participé au projet se présente pour faire un compte-rendu du projet. Ces personnes ne sont pas nécessairement des chercheurs dans le domaine du déploiement des systèmes ERP en milieu universitaire. De ce fait, il n'y a pas de suivi au niveau des communications d'une année à l'autre. Une telle situation ne sert pas la cause de la recherche sur le sujet. Il faut pouvoir faire de la recherche sur ce sujet au-delà des comptes-rendus. Il faut pouvoir étudier le sujet sous plusieurs angles dans le temps et dans l'espace. C'est à cette condition que l'on peut cerner les réalités du domaine et contribuer à améliorer la recherche et les pratiques.

Problématique

La présente thèse vise à répondre à un certain nombre de questions. Comment s'organise la fonction de gestion de projet dans le cadre de mise en œuvre des systèmes ERP en milieu universitaire ? A qui revient la fonction de gestion du projet : le département qui demande le système, le service informatique ou le fournisseur extérieur du système ? Comment se met en

place l'équipe de gestion du projet ? Comment assure-t-on l'embauche et la gestion des ressources humaines ? Qu'est-ce qui distingue l'environnement universitaire du point de vue de la gestion du projet ERP ? Quels sont les difficultés et les défis de la gestion de projets ? Quel rôle joue l'administration de l'université dans la gestion du projet ? Quels sont les facteurs critiques de succès de la mise en œuvre du système ERP ? Voici autant de questions qui fondent la présente thèse qui s'attelle précisément à répondre à celles-ci : (i) Quel est le point de vue des chefs des projets en ce qui concerne les difficultés et défis liés à la mise en œuvre des systèmes ERP ? (ii) Quels sont les tactiques et les défis dans le domaine de l'acquisition et de la gestion des ressources humaines ? (iii) Quel est le rôle et l'impact du parrainage du projet ERP par un cadre supérieur de l'organisation ?

Objectifs

La présente thèse a pour objectif d'analyser : 1) certains aspects de l'environnement de gestion du projet (organisationnel, humain, technologique) ; 2) certains aspects de la gestion des projets ERP dans l'environnement universitaire ; 3) certains aspects de la fonction de gestion de projet dans cet environnement ; 4) les particularités et les défis de la gestion des projets ERP et les facteurs de succès dans l'environnement universitaire ; 5) l'importance de la fonction de gestion du projet dans la réussite de la mise en œuvre du système ERP.

Méthodologie

S'appuyant sur le cadre théorique et conceptuel de la gestion de projet, l'auteur a procédé à 1) une revue de la littérature et à 2) une collecte des données pour rédiger la thèse. En conformité avec le choix de la thèse par articles, l'auteur a fait une revue de la littérature tridimensionnelle portant sur les trois articles qui constituent l'ossature de la thèse. Ensuite, l'auteur a effectué une collecte de sources documentaires portant sur la mise en œuvre des systèmes ERP en milieu universitaire. Cette collecte d'informations documentaires a été

suivie d'un travail d'enquête sur le terrain au moyen d'entrevues semi-structurées. L'auteur a jugé qu'environ une douzaine de projets représenterait un échantillon suffisant. L'auteur a entrepris des actions de communication en direction des chefs de projets ERP en milieu académique en vue de la sélection d'un tel échantillon. En fin de compte, treize projets ayant répondu favorablement aux sollicitations ont été retenus. L'auteur a préparé des questionnaires pour collecter les informations auprès des chefs de projets. Toutes les informations collectées à travers les entrevues et les sources documentaires ont été utilisées pour l'analyse et la rédaction de la thèse. L'auteur a fait le choix méthodologique d'étudier les questions de la thèse du point de vue du chef de projet. De fait, le chef de projet a été au centre de la stratégie de collecte des données.

Résultats

L'auteur de la présente thèse a collecté des données sur chaque sujet traité dans le cadre de la thèse. L'objectif était de pouvoir relever les aspects positifs et les défis de la gestion des projets ERP afin de tirer des leçons, de faire des suggestions et de développer des stratégies pouvant contribuer à améliorer la gestion des projets ERP en milieu universitaire. La collecte des données a porté sur treize projets académiques. L'étude a permis de découvrir l'organisation des projets, les divers facteurs qui influencent les projets, les questions de ressources humaines, les difficultés rencontrées et les stratégies pour résoudre ces difficultés.

À travers l'article (i), l'auteur a analysé les défis majeurs –du point de vue du chef de projet-- dans le cadre de chaque projet et l'impact de ces défis sur le processus de mise en œuvre du projet. Cela a permis de dégager des leçons pouvant contribuer à la sélection, à la formation de futurs chefs de projet, à la planification et à la gestion d'autres projets dans le futur. L'article (ii) a donné l'occasion d'analyser les questions liées à l'acquisition et à la gestion des ressources humaines dans le cadre des projets ERP en milieu universitaires. Cette étude a permis de relever les stratégies d'acquisition de ces ressources humaines, les difficultés inhérentes à cette activité et la gestion quotidienne de ces ressources. À travers l'article (iii), l'auteur a analysé le concept et le rôle du parrainage du projet (par un

4

administrateur de l'institution) afin d'en apprécier l'opportunité et la portée sur la réussite du projet. Les leçons tirées de cette étude permettent de traiter cet aspect du projet ERP dans le cadre d'autres projets dans le futur.

Plan

En plus de l'introduction, cette thèse comprend les parties présentées ci-dessous. Le chapitre 2 portant sur les fondements de l'étude présente la méthodologie du travail et les données sur lesquelles s'appuie la thèse. Le chapitre 3 porte sur la perception des défis et des problèmes par les chefs de projet dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire. Le chapitre 4 se consacre aux tactiques et aux défis dans le domaine des ressources humaines. Le chapitre 5 porte sur le parrainage des projets ERP en milieu universitaire par des membres influents de l'administration de l'institution. Ce chapitre 5 est suivi par la conclusion de la thèse.

Chapitre 1 : Fondements de l'étude

1.1 Introduction aux fondements de l'étude

Le présent chapitre présente les fondements de l'étude, lesquels fondements prennent en compte en principe le cadre théorique et conceptuel, la revue de la littérature et la méthodologie de la recherche. Étant donné que l'auteur a choisi l'option de la thèse par articles, la revue de la littérature est faite au niveau de chaque article. La méthodologie de la recherche présente la méthode de recherche qualitative -- qui est le choix de l'auteur -- et présente brièvement la méthode de collecte des données.

1.2 Cadre théorique et conceptuel

Le projet ERP est un projet informatique dont la complexité et l'organisation représentent un défi du point de vue de la gestion du projet. Le cadre de la gestion de projet constitue le cadre théorique et conceptuel de référence pour étudier le sujet. L'étude s'appuie sur ce cadre comme cadre théorique de réflexion et d'analyse. L'auteur se réfère aux bonnes pratiques en gestion de projet telles que élaborées dans le référentiel des connaissances en gestion de projet (PMBOK, Project Management Institute, 2004). Tout en se référant à ce cadre, l'auteur reconnaît que chaque projet a son contexte et que ce cadre n'apporte pas toujours des réponses automatiques et adéquates à toutes les questions. Il est donc nécessaire d'analyser et de comprendre les réalités de chaque contexte qui peuvent avoir une incidence sur les phénomènes à l'étude.

1.3 Méthodologie de la recherche

Pour réaliser la présente étude, l'auteur a choisi d'utiliser la méthodologie de recherche qualitative. La présente section comprend trois parties. La première partie est une introduction à la recherche qualitative. La deuxième partie donne une introduction à l'application de la recherche qualitative au domaine des systèmes d'information. La troisième partie démontre de montrer comment l'approche qualitative s'applique dans le contexte de la présente étude.

1.3.1 La Recherche qualitative

La recherche qualitative provient des sciences sociales, particulièrement de l'anthropologie et de la sociologie. Cette méthode a pris de l'importance de façon progressive. Elle a été acceptée et elle est devenue populaire non seulement dans son berceau des sciences sociales mais également dans d'autres domaines tels que l'éducation, les sciences de l'information, les sciences de la gestion et les systèmes d'information. La recherche qualitative a développé différentes méthodes de collecte et d'analyse des données. La présente introduction explique le choix de la recherche qualitative et donne sa définition ainsi que des informations concernant ses fondements philosophiques. Cette introduction aborde également les différentes méthodes de recherche et de collecte des données.

La recherche qualitative a été choisie pour la présente thèse pour deux raisons. D'abord la revue de la littérature concernant la recherche dans le domaine des systèmes d'information indique que cette méthodologie est de loin la plus populaire. D'autre part, l'espace de la mise en œuvre des systèmes ERP est un environnement complexe comprenant la technologie, les informations/données et les personnes d'horizons divers. Il y a un grand nombre d'acteurs aux attitudes différentes qui jouent différents rôles dans le projet. La recherche qualitative permet de collecter de façon appropriée l'information qu'il faut afin de comprendre les interactions et les relations entre les personnes, la technologie et les données dans le processus de mise en œuvre du système qui représente un phénomène social. La

7

recherche qualitative se présente donc comme une méthodologie appropriée pour cerner la réalité de l'étude.

1.3.2 Définitions de la recherche qualitative

Différents chercheurs définissent la recherche qualitative de différentes façons en fonction de la discipline. La recherche qualitative s'appuie sur les informations verbales, écrites ou orales et l'observation de l'auditoire cible dans le processus. Elle valorise les opinions de l'auditoire cible, observe et décrit leurs comportements, leurs attitudes et leurs expériences. Entre autres définitions, on peut retenir que :

> "Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them." (Denzin et al., 2000, p.3)

La recherche qualitative cherche donc à comprendre les acteurs et les artefacts dans le contexte social de l'étude. Elle se subdivise en plusieurs approches dont l'ethnographie, l'étude de cas, la recherche-action et la théorie ancrée. Pour collecter les données, le chercheur a recours au travail sur le terrain, l'observation, les enquêtes à base de questionnaires, les documents ainsi que la perception et l'analyse du chercheur lui-même. La recherche qualitative s'oppose ou coexiste avec la méthodologie de recherche quantitative. Contrairement à la méthodologie qualitative, la recherche quantitative s'appuie sur la mesure et autres données statistiques. Cette méthodologie est beaucoup plus utilisée dans les sciences pures telles que les sciences physiques/naturelles. Cependant, dans plusieurs cas, la recherche

qualitative et la recherche quantitative peuvent être complémentaires dans une même étude. Tel est souvent le cas dans des domaines comme les sciences de l'éducation.

1.3.3 Fondements philosophiques de la recherche qualitative

Myers (1997) souligne que la recherche qualitative repose sur trois considérations philosophiques : la recherche positiviste, la recherche interprétative et la recherche critique. Ces trois éléments représentent donc l'épistémologie qui sous-tend la recherche qualitative.

1.3.3.1 La Recherche positiviste

Le positivisme est une théorie en philosophie et en sociologie initiée par Auguste Comte au dix-neuvième siècle. Le positivisme promeut l'utilisation de méthodes scientifiques rigoureuses pour découvrir la connaissance. Dans le cadre de cette théorie, chaque sujet d'étude existe en tant qu'objet et cet objet peut être étudié avec des méthodes objectives et scientifiques.

1.3.3.2 La Recherche interprétative

L'approche interprétative postule que la réalité est une construction sociale exprimée à travers le langage et les conventions sociales. Dans cette théorie, la réalité ne semble pas avoir une existence objective. Elle est plutôt une interprétation dans un contexte social. La recherche interprétative provient de l'herméneutique et de la phénoménologie. Étudier un phénomène, c'est comprendre le contexte social qui génère et donne du sens à ce phénomène.

1.3.3.3 La Recherche critique

La théorie de la recherche critique provient de la philosophie. Dans cette théorie, la réalité – la réalité concernant les sociétés – existe dans une dimension historique. Cette réalité évolue dans la société dans le temps. Cette théorie semble limiter la recherche à une analyse critique de la société. Cependant, la pensée critique qui s'appuie sur des données empiriques met l'accent sur la preuve, la précision, l'exhaustivité et une juste appréciation de la réalité.

1.3.4 Méthodes de recherche qualitative

Plusieurs méthodes de recherche coexistent au sein de la recherche qualitative. Une méthode de recherche représente un choix, un état d'esprit qui guide la collecte des données et l'analyse. Le choix d'une méthode donnée varie en fonction de la recherche à effectuer et aussi en fonction des préférences du chercheur. Dans un contexte donné, une méthode peut être mieux indiquée qu'une autre.

1.3.4.1 La Recherche-action

Plusieurs définitions de la recherche-action coexistent dans la littérature. L'une des définitions les plus citées est celle de Rapoport (1970) qui définit la recherche-action de la façon suivante:

> "Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework." (Rapoport, 1970, p. 499).

La recherche-action suppose et valorise la collaboration des participants dans le contexte de l'étude.

1.3.4.2 L'Étude de cas

Une étude de cas est une étude empirique d'un phénomène dans un contexte spécifique. Cette méthode n'utilise pas un échantillon quantitatif et diversifié. L'approche cherche à étudier de façon exhaustive un seul cas en s'appuyant sur les données que l'on peut collecter de différentes façons dans ce contexte. La collecte et l'analyse préliminaire des données se déroulent donc dans ce seul contexte. Une étude de cas peut être exploratoire. L'étude de cas est appropriée pour l'étude de la mise en œuvre des systèmes ERP en ce sens qu'elle permet de se concentrer sur un projet dans un contexte organisationnel précis. On peut ainsi rendre compte de façon exhaustive des événements et des faits dans les limites de ce contexte.

1.3.4.3 L'Ethnographie

L'ethnographie provient de l'anthropologie. Dans cette discipline d'origine, l'application de la méthode de recherche ethnographique exige que le chercheur passe du temps sur le terrain pour observer, apprendre et collecter les données de l'étude. En effet, l'ethnographie est une méthode qui lie la collecte des données à l'observation des acteurs cibles sur le terrain de l'étude. En anthropologie culturelle, l'ethnographie a recours aux entrevues afin de comprendre les coutumes et les points de vue locaux sur le monde. Dans le domaine de la mise en œuvre des systèmes ERP, cela se traduit par des entrevues avec les acteurs du projet, l'observation de leurs perceptions, leurs attitudes et leurs comportements. Il s'agit aussi de comprendre la culture de l'organisation qui a certainement un impact important sur le projet.

1.3.4.4 La Théorie ancrée

La théorie ancrée a été développée par les sociologues américains Barney G. Glaser et Anselm L. Strauss dans les années 1960. La théorie ancrée promeut une étude empirique basée sur la collecte et l'analyse des données de façon systématique afin d'établir la théorie. La collecte des données s'appuie sur les entrevues, l'observation et les documents. La collecte des données et l'analyse sont itératives et peuvent se chevaucher.

La recherche qualitative collecte des données empiriques. Cette collecte des données empirique utilise des méthodes telles que les entrevues, l'observation, les récits, les enquêtes à base de questionnaires. Les documents écrits sont pris en compte. En général, on collecte des données verbales, textuelles ou visuelles. Dans le cadre de la mise en œuvre des systèmes ERP, on peut collecter les documents suivants : charte du projet, plan du projet, cahier de charge, organigramme du projet, documents de communication sur papier ou sous forme électronique.

1.4 Recherche qualitative et systèmes d'information

Le but de la présente section est de montrer la façon dont la recherche qualitative s'applique concrètement à la recherche dans le domaine des systèmes d'information. La recherche qualitative est acceptée et utilisée comme méthodologie de recherche dans le domaine des systèmes d'information. Dans ce domaine, la recherche qualitative cohabite avec la recherche quantitative qui est la méthode préférée. Comme le souligne Trauth :

> "As the limitations of quantitative methods for social science research in the information systems field have come to be recognized, increasing attention is being paid to the rich and variety available from alternative approaches offered by qualitative methods." (Trauth, 1997).

La rencontre *International Conference on Information Systems and Qualitative Research* qui s'est déroulée en juin 1997 et qui a porté sur le thème "Information systems and Qualitative research" a été une plateforme pour l'affirmation et l'illustration de cette réalité. C'est la raison pour laquelle Markus (1997) déclare que :

> "Today, most-high status members of the IS community acknowledge that qualitative research methods occupy an important niche along with formal modeling and qualitative empirical methods (survey and experiments). Qualitative studies and methodological essays dealing with qualitative methods increasingly appear in our conference and journals". (Markus, 1997).

Plusieurs études illustrent l'utilisation de la recherche qualitative dans le domaine des systèmes d'information. Lau (1997) fournit "a review of the use of action research in information Systems studies". Prasad (1997) affirme que "In the IS field, as on most others, the term *ethnography* has become the label of choice to designate qualitative field work involving a sizeable amount of onsite observation". La théorie critique est également utilisée dans ce domaine des systèmes d'information. Ngwenyama et al. (1997) reconnaissent ce fait en affirmant que:

12

The Critical Social Theory (CST) program of information systems research is now just over a decade. Although the number of researchers associated with the CST program are few, they have had a disproportionately large impact on the field than other research communities". (Ngwenyama et al, 1997).

La théorie ancrée est utilisée par Urquart (1997) "to investigate interaction in informal requirement gathering" dans une étude portant sur la communication analyste-client. D'autre part, en s'appuyant sur la littérature dans le domaine, Myers (2004) affirme que l'étude de cas est la méthode qualitative la plus utilisée dans l'étude des systèmes d'information.

1.4.1 Application des méthodes qualitatives à l'étude des systèmes ERP

Pour la plupart des chercheurs dans le domaine des systèmes d'information, les systèmes ERP représentent juste un autre type de systèmes d'information. De ce fait, si la recherche qualitative s'applique bien à l'étude des systèmes d'information, il va de soi qu'elle s'applique à l'étude des systèmes ERP. La grande majorité des études sur les systèmes ERP utilisent la méthodologie de recherche qualitative ou au moins un certain nombre de techniques de recherche qualitative. La plupart de ces études utilisent les méthodes d'étude de cas, la recherche-action ou la théorie ancrée. De nombreuses études (Furumo et al. , 2004 ; Katz et al., 2002 ; Sarkis et al., 2003 ; Tchokogué et al., 2005 ; Xue et al., 2005 ; Yakovlev et al. ; 2003, Yusuf et al., 2004 ; Brown et al., 2003 ; Caruso et al., 2002) illustrent l'utilisation de la recherche qualitative dans le domaine des systèmes ERP.

1.4.2 Application des méthodes qualitatives à la présente étude

Il est utile de rappeler que la présente porte sur « la gestion des projets de mise en œuvre des systèmes ERP en milieu universitaire » et que l'auteur a choisi la méthode de la thèse par articles. De ce fait, l'auteur définit une série d'articles autour du thème ci-dessus énoncé. Dans le cadre de ce thème, l'auteur a défini les sujets d'articles suivants : (i) ERP Systems'

Implementation in Higher Education: Project Managers' Perception of Issues and Challenges ; (ii) ERP Projects in Higher Education: Staffing Tactics and Challenges ; (iii) Executive Sponsorship and ERP Implementation in Higher Education. Pour traiter les différents aspects de la thèse et rédiger les articles ci-dessus énoncés, l'auteur a eu recours à la théorie ancrée.

1.4.2.1 Application de la théorie ancrée

Comme indiqué précédemment, la théorie ancrée est une méthode de recherche qualitative qui s'appuie sur la collecte et l'étude systématique des données en utilisant les entrevues, les enquêtes, les sources documentaires et l'observation afin de construire une théorie. Pour analyser les différentes composantes de la présente étude, l'auteur a utilisé les méthodes de collecte de données mentionnées ci-dessus. La compréhension née de cette étude a permis à l'auteur de développer un modèle d'analyse et de compréhension applicable à des cas similaires dans d'autres contextes. La collecte des données et le développement d'un modèle se font de façon itérative et s'enrichissent mutuellement. L'auteur a appliqué la théorie ancrée aux différentes composantes (articles) de l'étude. Dans ces cas, il a été question de collecter des données conformément à l'approche de la théorie ancrée sur de nombreux sites de mise en œuvre des systèmes ERP. Les données collectées et l'analyse de ces données ont permis de dégager des principes et des modèles d'analyse et de compréhension pour la mise en œuvre des systèmes ERP dans d'autres contextes.

1.4.2.2 Collecte des données

Comme indiqué précédemment, la présente étude a fait le choix méthodologique de comprendre l'ensemble de ces problèmes du point de vue du chef de projet. De ce fait, le chef de projet a été au centre de la stratégie de collecte des données. Pour collecter les données de l'étude, il a fallu sélectionner d'abord un certain nombre de sites à considérer. L'auteur de l'étude a sélectionné plusieurs dizaines de sites académiques à travers les États-Unis. En fin de compte l'auteur a retenu les treize sites qui ont accepté de collaborer à l'étude. L'auteur a collecté les données au moyen des entrevues, des enquêtes à base de questionnaires et en ayant recours aux sources documentaires. L'auteur de l'étude a préparé des questionnaires en

rapport avec les questions de l'étude. Ensuite, il a pris contact avec les institutions retenues. Au sein de chaque institution, il a été question de s'adresser à la personne indiquée pour discuter de la mise en œuvre des systèmes ERP du point de vue de la gestion de projet, c'est-à-dire le chef du projet. L'auteur de la présente thèse a collecté également des sources documentaires pertinentes. Avec la collaboration des institutions participantes, les documents suivants, – le cas échéant – ont été collectés : les documents de présentation de l'institution; charte du projet; documents de planification du projet; le cahier de charge; l'organigramme du projet; les documents de gestion de projet; les documents en rapport avec le budget du projet et les communications électroniques et sur papier.

Chapitre 2 : Difficultés et défis de la mise en œuvre des systèmes ERP du point de vue des chefs de projets

2.1 Résumé

Cet article examine la mise en œuvre des systèmes ERP en milieu universitaire en mettant l'accent sur les problèmes et les défis du point de vue des chefs de projet. On peut attribuer aux chefs de projet le succès ou l'échec du projet. La présente étude cerne le point de vue des chefs de projet concernant les défis de la mise en œuvre des systèmes ERP et compare ces points de vue aux facteurs critiques de succès et à la gestion de projet. La présente étude a pris en compte treize projets de mise en œuvre des systèmes ERP en milieu universitaire. Des entrevues ont été menées avec les chefs de ces projets pour avoir une meilleure idée de leurs perceptions concernant les nombreux défis inhérents à ces projets. Il ressort de la présente étude que 1) les défis perçus par les chefs de projet varient en fonction du contexte institutionnel et, dans plusieurs cas, ces défis se démarquent des facteurs critiques de succès documentés dans la littérature ; 2) certains défis sont propres au contexte de chaque projet. La présente étude contribue à la recherche sur la mise en œuvre des systèmes ERP en général et à recherche portant sur le milieu universitaire en particulier avec la proposition des trois catégories supplémentaires pour la classification des facteurs critiques de succès.

2.2 Commentaires

Ce chapitre n'a pas encore été soumis à une revue pour publication. J'ai initié l'idée de base de l'article en voulant découvrir et documenter le point de vue des chefs de projet des systèmes ERP. Après avoir consulté les professeurs Marc Frappier et Jean Éthier pour recueillir leurs avis et suggestions, j'ai mené le travail d'enquête sur le terrain et j'ai rédigé la première ébauche de l'article. L'apport principal de cet article est de 1) capter et de documenter le point de vue des chefs de projets en ce qui concerne les défis et des problèmes dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire et 2) de comparer ces points de vue aux facteurs critiques de succès documentés dans la littérature ; 3) de placer l'étude des facteurs critiques de succès des projets ERP dans le cadre de la gestion de projet.

ERP Systems' Implementation in Higher Education: Project Managers' Perception of Issues and Challenges

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2.3 Abstract.

This paper examines ERP (Enterprise Resource Planning) systems implementation in higher education and focuses on issues and challenges for the implementation project from the perspective of project managers (PM). Project success, just as project failure, can be largely credited to the PM. The study captures project managers' perspectives on ERP implementation challenges and shows how they relate to critical success factors (CSFs) and project management. To conduct the study, we considered thirteen ERP projects in higher education and interviewed their project managers to understand their perceptions regarding several issues and challenges stemming from these projects. The study finds out that 1) challenges perceived by project managers vary depending on the institutional context, and differ in several cases from CSFs documented in the literature; 2) some challenges are unique to the context of each project. Our study contributes the investigation of ERP systems implementation in general, and to studies in higher education in particular proposing three additional categories of CSFs.

2.4 Introduction

ERP projects are major information system projects that profoundly transform organizations, as they integrate and automate many organizational functions. They were initially developed for the manufacturing sector, with Manufacturing Resource Planning (MRP and MRP II) inventory systems (Rachid et al., 2002; Jacobs et al., 2006). In manufacturing, ERP systems integrate and automate disparate functions such as supply chain, production management,

18

financial, accounting, and human resources management. After success in manufacturing operations, use for ERP systems soon extended to other sectors as well, including non-manufacturing corporations, public administrations, and academic institutions. In these new sectors, ERP systems are essentially used as tools for accounting, finance, human resources, and customer-relations management.

Even after several decades of practice, implementing ERP still remains a challenging endeavor (Esteves-Souza and Pastor-Collado, 2000, 2007; Brown and Vessey, 2003; Umble et al., 2003; Al-Mashari et al., 2003; Soja, 2006). This conclusion applies particularly to the implementation of ERP systems in higher education (McCredie and Updegrove, 1999; Furumo et al., 2004; Cornford and Pollock, 2004; and Babaa'i, 2009), a sector marked by great complexity of managing some particularities related to governance, decision-making and culture. Just like studies on ERP implementation in general, those on implementation in higher education have some shortcomings. They can be contradictory, probably due to incomplete context descriptions. Furthermore, no study has focused on project managers' perceptions of ERP implementation issues and challenges. Information from project managers could certainly provide new insights and might enable more successful implementation of ERP systems in this sector. This study attempts to fill this gap by pursuing three objectives: (1) identify and categorize issues and challenges identified in the recent literature on the implementation of ERP in general and in the higher education sector in particular; (2) find out issues and challenges perceived by managers working in the higher education sector during the implementation of their ERP projects; (3) compare the results of (1) and (2) to show how issues and challenges identified by managers in higher education could help in the implementation of ERP systems in general.

2.5 Literature Review

2.5.1 Literature Proposing Models and Theories

In this section, we discuss literature on theories and models that tried to identify conditions to make ERP systems implementation more successful. Our purpose is to point out existing implementation success factors and problems.

One major study is a paper by Arinze et al. (2003) who proposed a methodology to rapidly configure ERP systems in the implementation process. Their purpose was to make the implementation process simpler, easier, cheaper, and less time-consuming. To this end, they designed the "Enterprise Object Model (EOM) as a framework and mapping method for capturing user requirements in general terms, transforming them into detailed configuration settings for ERP software". The study found that 1) the EOM approach was applicable across different ERP packages; 2) the EOM had a positive impact ERP system development and maintenance; and 3) successful extension of the EOM prototype resulted in significant configuration and maintenance savings.

Basu et al. (2003) provided an agency theory model that underlines the importance of vendor relationship management for achieving "both short- and long-term ERP project success". Basu et al. (2003) presented an agency theory model that was a discussion of vendor relationship management in ERP implementation. In this theory, the organization requesting the ERP system was the principal and the vendor was the agent. Their theory was based on two concepts: adverse selection and moral hazard. These two concepts were defined respectively as 1) the "agent's concealing of relevant information or misrepresenting his ability"; and 2) "the shirking of efforts by the agent", which "includes actions or behaviors inconsistent with the goals of the principal" (Basu et al. 2003). Both of these concepts have an adverse impact on the success of the ERP project. This study is important since vendor relationship management appeared as one of the major challenges of ERP systems implementation.

Bradford et al. (2003) drew upon the Diffusion of Innovation (DOI) theory and Information Systems Success (IS) theory to generate a model of ERP implementation

success. The model identified the following three categories of characteristics: innovative, organizational, and environmental. The findings of the study indicated 1) that top management support and training had a positive impact on the project; 2) perceived complexity of ERP and competitive pressure were negatively related; and 3) consensus in organizational objectives and competitive pressure had a positive impact on perceived organizational performance.

Huin (2004) presented a model for the use of multi-agents for the implementation of ERP systems in small and medium size enterprises (SMEs). The study was based on investigation in SMEs in South East Asia. This model (the major finding of the study) -- which aimed at coordinating the management of enterprise resources -- promoted better management of these resources and the ERP project. The architecture of this Enterprise Resources Management (ERM) Model was a three levels hierarchy with the coordination agent at the top of the hierarchy. Planning agents in the middle interacted among themselves and with the coordination agent above and execution agents below them. Execution agents interacted with the planning agent.

Luo and Strong (2004) proposed a framework for ERP implementation choices. This framework was meant for management decision regarding "customization choices and the capabilities required to accomplish them." The findings of this study were customization options presented in a table that indicated technical customization options in relation to process customization options.

El Amrani et al. (2006) discussed ERP implementation strategies and their effect on functionality across the organization. These authors contended that other studies do not address cross-functional overview of companies' problems. Their proposed strategies included organizational vision, process re-engineering, ERP scope and implementation schedule constraints. The major finding of this study was a theory of the effects of ERP implementation strategy which provided a research model.

Ifinedo (2006) proposed an ERP systems success measurement model based on a survey conducted in Finland and Estonia. It was an extension of the basic model proposed by Sedera and Gable (2004), which comprised the following elements: System Quality,

Information Quality, Individual Impact, and Organizational Impact. Ifinedo's model adds the following elements: Vendor/Consultant Quality, Workgroup Impact. Even though the focus and the purpose of their study were different, they pointed out vendor/consultant quality as a key area in ERP implementation.

Vilpola (2008) developed a Customer-Centered ERP Implementation (C-CEI) method for the analysis of ERP system requirements based on empirical research data. The study based on an action research methodology placed the user at the center of the requirements engineering process. The C-CEI method 1) adopted user-centered design principles promoting user involvement at all levels of the institution, and 2) required a multidisciplinary design team, iteration of design results, and allocation of users. The C-CEI also took into account contextual design principles analyzing the institutional context of the system.

Soffer et al. (2005) proposed an Object-Process methodology for requirements engineering in line with the needs of the receiving organization. The study tried to solve the problem of identification and analysis of the gaps between an ERP system and the requirements of an institution. The ultimate goal was to align the system to the needs of the institution. The authors claimed that their methodology provided systematic support for this alignment process and facilitated reuse of the basics of the requirements of the enterprise.

Lea et al. (2005) proposed a similar user-centered architecture for a prototype multi-agent ERP system. This model underlined the interaction/communication between human agents, intelligent software agents and the different components/units of the information technology infrastructure. It was meant to facilitate integration of existing information systems and commercial ERP systems in a way that avoided problems related to ERP implementations.

Morton and Hu (2008) used a structural contingency theory to analyze ERP implementation and adoption. The study contended that implementation success depended on the fit between structures of the receiving organization and standardized business processes embedded within the ERP systems. This study concluded that "organizational structures" and "business processes" are key ERP implementation success factors.

The table below summarizes ERP implementation success factors derived from these studies. They are grouped in three categories: project resources/organizational issues, project management/strategy activities, organization issues and technical issues.

CSFs in Studies on Theories and Models		
Categories of Factors	**Factors**	**Authors**
Project Resources and Organizational Issues	Obtain and maintain financial resources throughout the project	Arinze et al. (2003)
	Obtain top management support	Bradford et al. (2003)
	Define organizational objectives, consensus/vision	Bradford et al. (2003); El Amrani et al. (2006)
	Present favorable organizational structures	Morton & Hu (2008)
Project Management/Strategy	Manage project complexity (resources, people, technology, organizational units)	Arinze et al. (2003); Bradford et al. (2003)
	Define ERP project requirements (requirements engineering)	Vilpola (2008); Soffer et al. (2005) ; Lea et al. (2005)
	Manage relationships with vendors management	Basu et al. (2003)
	Manage perceived complexity of the ERP solution	Bradford et al. (2003)
	Reengineer business processes to adapt to ERP software	Bradford et al. (2003); El Amrani et al. (2006) ; Morton & Hu (2008)
	Provide training to project staff and users	Bradford et al. (2003)
	Handle pressure from competitions (competing organizations)	Bradford et al. (2003)
	Plan and manage ERP projects	Huin (2004)
	Coordinate and integrate of enterprise resources	Huin (2004)
	Communicate within the organization and the project	Huin (2004)
	Define project scope and customization	Luo & Strong (2004)
	Define the scope of ERP modules implemented	El Amrani et al. (2006)

	Implement the ERP project faster	El Amrani et al. (2006)
	Define project measurement/metrics	Ifinedo (2006)
	Provide user/customer-centered Implementation	Vilpola (2008); Soffer et al (2005) ; Lea et al.
Technical issues	Provide ease of configuration of the ERP system	Arinze et al. (2003)
	Manage technical compatibility	Bradford et al. (2003)

Table 2-1 : CSFs perceived in Studies on Theories and Models

From this table, one can observe that: 1) the largest number of factors falls within the "project management/strategy" category; 2) the second largest category is "project resources and organizational issues"; 3) the category of "technical issues" has the smallest number of factors. From these observations, it is safe to say that ERP systems implementation challenges are largely "project management/strategy" related. Resources represent a critical aspect of ERP implementation. It is critical to properly estimate resources and to provide appropriate resources. ERP implementation does not pose extensive technology challenges. This indicates that the ERP technology has evolved and matured over the years and is under control.

2.5.2 Literature proposing systematic analyses of CSFs

This section focuses on studies that are self-declared systematic discussions of critical success factors (CSFs). CSFs can decisively impact the success of an ERP implementation project. They can become challenges and issues. A CSF is derived from field experience and is prospective in nature. It is intended to help avoid problems for future projects. A large number of studies focus on ERP implementation CSFs in industry.

Parr et al. (1999) considered 42 ERP implementation projects and identified the following CSFs: obtain management support, hire best people fulltime on the project, empower decision makers, provide project champion, provide vanilla ERP implementation (with limited customization), define smaller scope for project, define project scope and goals,

24

provide a balanced team (technical as well as business expertise), and commit organization to change. This list is based on an extensive study of CSFs proposed in the literature.

Somers et al. (2004) made the following list of CSFs in decreasing order of importance: (1) obtain top management support, (2) select competent project team, (3) secure interdepartmental co-operation, (4) define clear goals and objectives, (5) provide project management, (6) provide interdepartmental communication, (7) manage project teams and users' expectations, (8) provide project champion, (9) secure vendor support, (10) select ERP package carefully, (11) provide data analysis and conversion, (12) provide dedicated resources for the project, (13) put in place a steering committee, (14) provide user training, (15) educate project staff and users on new business processes, (16) reengineer business processes, (17) allow minimal customization, (18) make architecture choices, (19) provide change management, (20) secure vendor partnership, (21) use vendor's tools, and (22) use of consultants to supplement internal staff.

Brown and Vessey (2003) developed a contingency framework for ERP systems implementation based on the following CSFs: obtain top management support, put in place project team and leadership, pay attention to change management, use third party consultants, manage project complexity (resources, technology, people, organizational units), define extent of process innovation, define degree of package customization, and define conversion strategy.

Umble et al. (2003) determined the following ten categories of CSFs: clear understanding of strategic goals, commitment by top management, excellent implementation project management, great implementation team, successfully coping with technical issues, organizational commitment to change, extensive education and training, data accuracy, focused performance measures, and multisite issues resolved.

Pursuant of an effort of organization and synthesis, Al-Mashari et al. (2003) created a taxonomy of CSFs based on existing CSFs in the literature. This taxonomy included: project management & leadership, project visioning and planning, ERP package selection, ERP project communication, business process management, staff and users training and education,

ERP project management, legacy systems management, technology systems integration, ERP system testing, cultural and structural testing, performance evaluation and management.

Nah et al. (2001) provided the following list of eleven frequent critical success factors in the literature: (1) ERP teamwork and composition, (2) change management program and culture, (3) top management support, (4) business plan and vision, (5) business process re-engineering and minimum customization, (6) effective communication, (7) project management, (8) software development, testing, and troubleshooting, (9) monitoring and evaluation of performance, (10) project champion, and (11) appropriate business and information technology legacy systems. The table below (reusing categories presented and defined in Section 2.1 above) summarizes CSFs.

Critical Success Factors in Systematic Studies of CSFs		
Categories of Factors	Factors	Authors
Project Resources and Organizational Issues	Provide dedicated resources	Somers et al. (2000)
	Obtain top management support	Parr et al. (1999) ; Somers et al. (2000) ; Brown & Vessey (2003); Umble et al. (2003); Al-Mashari (2003); Nah et al. (2001)
	Use external consultants to supplemental internal staff	Somers et al. (2000); Brown & Vessey (2003)
	Define clear goals and objectives for the project	Somers et al. (2000)
	Commit organizational to change	Umble et al. (2003)
Project Management/Strategy	Provide project management	Somers et al. (2000); Umble et al. (2003) ; Al-Mashari (2003) ; Nah et al. (2001)
	Provide project team/champion	Parr et al. (1999) ; Somers et al. (2000) ; Brown & Vessey (2003); Umble et al. (2003); Nah et al. (2001)
	Provide project plan vision/goals	Parr et al. (1999) ; Somers et al. (2000) ; Umble et al. (2003) ; Al-Mashari (2003) ; Nah et al. (2001)
	Define projet scope management	Parr et al. (1999); Toni Somers et al. (2000) ; Brown & Vessey (2003); Nah et al. (2001)

	Manage project complexity (resources, people, technology and organizational units)	Brown & Vessey (2003); Umble et al. (2003)
	Provide project communication	Somers et al. (2000); Nah et al. (2001)
	Evaluate and measure project performance (evaluation, measures)	Umble et al. (2003); Al-Mashari (2003); Nah et al. (2001)
	Define and manage business processes	Somers et al. (2000); Al-Mashari (2003); Nah et al. (2001)
	Provide change management	Parr et al. (1999); Nah et al. (2001); Umble et al. (2003)
	Provide careful software acquisition/selection	Somers et al. (2000)
	Manage vendor/consultant relationships	Somers et al. (2000)
	Provide project staff and users' training/education	Somers et al. (2000); Umble et al (2003) ; Al-Mashari (2003)
Technical issues	Handle legacy systems/data conversion	Somers et al. (2000); Brown & Vessey (2003); Umble et al (2003); Al-Mashari (2003); Nah et al. (2001)
	Provide software development, testing, and troubleshooting	Al-Mashari (2003); Gargeya & Brady (2005); Nah et al. (2001)
	Define software customization	Parr et al. (1999); Somers et al. (2000) ; Brown & Vessey (2003); Nah et al. (2001)
	Make technology architecture choices	Somers et al. (2000)
	Cope successfully with technical issues	Umble et al. (2003)
	Provide ERP system integration	Al-Mashari (2003)

Table 2-2 : Critical Success Factors in Systematic Studies of CSFs

The largest number of CSFs falls in the "Project management/strategy" category. "Project resources and organizational issues" are important, particularly with regard to the availability of executive support. Technical issues are important particularly in the areas of legacy systems/data conversion and software customization. This table shows that "project

27

management/strategy" issues are the most important. Project management is a critical aspect of ERP implementation. It is important to have all the human, material and technology resources needed. But one needs to be able to skillfully put in place and run a huge project that engages the entire institution.

2.5.3 Literature on ERP in Higher Education

A number of articles in the literature presented studies of ERP implementation in higher education. Literature reviews by Esteves and Pastor (2005), Botta-Genoulaz et al. (2005) and Moon (2007) indicated that the number of such studies is limited. A number of these articles on ERP implementation in higher education presented CSFs and/or lessons learned.

Pirani et al. (2002) identified the following CSFs: culture of the institution/campus, strong top-down leadership within the institution, separate project site for technical and function teams, providing campus wide communication, providing project auditing, reducing cost of project ownership through IT flexibility, transitioning IT staff to a new IT environment. McCredie and Updegrove (1999) identified twenty-two lessons derived from panel discussions on ERP implementation in higher education. The list of lessons covered the life cycle of ERP systems deployment including project decision-making processes, providing project resources, defining project management and strategy, and managing project post-implementation questions. Furumo et al. (2004) did not identify any CSFs. They tried to see how the following CSFs identified in corporate settings were managed by two institutions: technology fit (adapting the ERP systems to technology needs of institutions), providing change management, organizational/institutional culture, ERP project management and obtaining management support and advocacy.

Scott and Wagner (2003) discussed an ERP implementation within the academic administration of an Ivy League university. The project was implemented by different actors with different understandings, clock time, and subjective times. This resulted in different and conflicting priorities, interests, and rationales for the ERP project. This issue is related to CSF "defining clear goals and objectives for the project" by Somers et al. (2004).

28

Most studies about higher education were not concerned about identifying and classifying critical success factors in general terms. Their focus was on proving that higher education institutions were different and had specific needs in terms of ERP implementation. Cornford and Pollock (2004) emphasized the unique nature of ERP systems implementation in higher education, as ERP systems designed for the corporate world could not readily extend into academic institutions. The article emphasized that universities had common ground with other organizations, but they also had differences (organization, businesses, culture, decision-making process) that mattered in terms of ERP systems implementation.

In concordance with this viewpoint, Babaa'i (2009) stated that unlike corporate organizations, higher education institutions required unique systems for: Student Administration, Course/Unit Administration, Facilities (Timetabling) requirements, and other applications, not part of traditional ERP. Cornford and Pollock (2004), and Babaa'i (2009) did not explicitly present lessons learned or CSFs. However, they underlined the specific nature of higher education institutions in terms of organizational structure, units and operations, politics and culture.

A number of studies tried to point out higher education specific factors. Voloudakis (2002) identified four areas of lessons learned: project governance, management and organization, project approach and outcomes, technical and learning and knowledge. David Allen et al. (2002) proposed four additional higher education specific CSFs: organizational culture, political structures, social construction of technological legacy, and relationship and knowledge management.

Nielsen (2002) proposed the most comprehensive and systematic analysis of the applicability of CSFs (identified in corporate organizations) to higher education institutions. She reviewed all significant lists of CSFs in the literature and came up with a list of twenty-nine CSFs. However, she referred primarily to lists by Holland & Light (1999) and Brown and Vessey (2003). Her point was to verify how many of these CSFs were relevant in academic institution. She concluded that "twenty-two of the twenty-nine identified CSF's from literature were found from interviewees' responses. Seven CSF's from the literature review were not found discussed during the interviews." (Nielsen, 2002). She found four

new factors that she considered specific to the academic setting: (1) gaining competitive edge, (2) providing service for students, (3) providing knowledge management, and (4) defining system ownership. Her list of CSFs common to corporate organizations and higher education includes practically all frequent CSFs in corporate organizations mentioned at the end of section 2.2. Based on her study and other studies on higher education, it is safe to state that corporate and higher education institutions share most frequent CSFs. In addition to these frequent CSFs, each domain has some specific CSFs. Table 3 summarizes issues specific to academic institutions. It underlines the importance of academic culture, organization, politics, units and operations. These elements certainly impact not only the structure of ERP packages for higher education, but the entire implementation process.

ERP Implementation CSFs specific to Higher Education		
Categories of Factors	**Factors**	**Authors**
Higher Education Specific CSFs	Take into account organizational structure, divisions, units and operations	Cornford & Pollock (2004); Babaa'i (2009)
	Gain competitive edge, provide service for students; define system ownership	Nielsen (2002)
	Take into account social construction of technological legacy, and relationship	Allen et al. (2002)
	Pay attention to politics and culture, political structure, power play	Cornford & Pollock (2004), and Babaa'i (2009); McCredie & Updegrove (1999)
	Provide knowledge management	Nielsen (2002); Allen et al. (2002)
	Pay attention to specific nature, culture and needs of higher education institutions	Cornford & Pollock (2004); Babaa'i (2009); Nielsen (2002); Allen et al. (2002); Scott & Wagner (2003)

Table 2-3 : Category of CSFs Specific to Academic Institutions

2.5.4 Summary of Literature Review

All three types of literature (models and theories, systematic analyses of CSFs, higher education specific) share the same generic success factors including: provide top management support, provide project management, manage project complexity, provide project team/champion, define project plan vision/goals, provide communication, define and manage business process, provide change management, define and manage software customization, and define project requirements. The largest number of factors can be found in the project management/strategy category. The higher education field has additional factors that are domain specific factors. In the same way, any analysis that focuses on a domain such as a specific manufacturing or service industry will certainly provide additional domain specific factors. The potential to identify additional domain specific issues is a major justification of our study.

The literature on ERP implementation has strengths and gaps. This literature is abundant, particularly in the area of factors that impact project success. CSFs are well documented. This literature covers implementation in a wide range of domains, industries and countries. A number of these studies propose ERP implementation theories, strategies and models to help improve success rates. These studies cover all stages of the ERP life cycle. Most of these studies on ERP implementation are limited to one or two projects. Results of these studies can only be incomplete or inconclusive since they are not based on large samples. The literature on ERP implementation in higher education is very limited. These few studies on higher education typically focus on one or two projects only. These strengths and weaknesses of the literature clearly indicate the need and the opportunity for more research on ERP implementation in higher education.

2.6 Methodology & Research Design

2.6.1 Theoretical and Conceptual Framework

ERP systems implementation can be studied within the framework of project management. We consider the Project Management Body of Knowledge (PMBOK) development by the Project Management Institute as the reference. We articulated our thought and our research questions for this study using the PMBOK as reference framework. We use this framework because ERP systems implementation is a project management enterprise and research literature (particularly on critical success factors) points out the importance of project management.

2.6.2 Projects/Institutions Considered

2.6.2.1 The Selection Process

We used the Internet to search for academic institutions that have implemented or were implementing ERP systems. We used the website of major higher education ERP software vendors and ERP software users groups to find information about academic institutions using ERP systems. These different searches allowed us to establish a list of institutions. Then, we used the web to search for the project managers of these institutions. We prepared and sent e-mails to fifty project managers to ask for interviews with them. Of these, twenty-six responded and thirteen accepted our interviews. We ultimately focused our study on these thirteen projects. All selected projects claimed to have been successful because their systems were up and running. In this paper, we refer to these projects as Projects 1 through 13. Similarly, we refer to a project's institution as Institution x, and to its project manager as Project Manager X. The following table provides a brief summary of the characteristics of the institutions selected.

Institution	Size (Number of students, estimates)	Number of distinct campuses	Governance structure / Project structure	Project timeframe
Institution 1	~ 40,000	3 (plus an autonomous medical school)	Decentralized/Centralized	1996-2001
Institution 2	~ 42,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 3	~ 40,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 4	~ 70,000	4 (plus several extension centers	Decentralized/Centralized	2000-2005
Institution 5	~ 21,000	1 (plus several extension centers)	Centralized/Centralized	2001-2003
Institution 6	~ 12,000	12 (plus several extension centers)	Decentralized/Decentralized	2001-2005
Institution 7	~ 14,000	1 (plus several extension centers)	Centralized/Centralized Project	2003-2006
Institution 8	~ 18,000	1 (plus four satellite campuses)	Decentralized/Centralized Project	2003-2007
Institution 9	~ 10,000 (65% part time)	1 (with 2 urban campuses)	Centralized/Centralized Project	2004-2008
Institution 10	~ 32,000	1 (with 2 urban campuses)	Centralized/Centralized Project	2004-2007
Institution 11	~ 8,000	1	Centralized/ N/A	2005-2008
Institution 12	~ 60,000	1 (with 4 urban campuses)	Centralized/Centralized Project	2006-2007
Institution 13	~ 13,000	1 (plus 4 outreach programs)	Centralized/Centralized Project	2006-2009

Table 2-4 : Basic Information about Institutions Analyzed

Institution (1) is a large university with two separate and autonomous campuses, a medical campus, and a decentralized governance structure. The ERP project was a centralized implementation for the entire institution. Institution (2) is a large university with seven

separate major campuses and several minor campuses and extension centers. The institution has a decentralized governance structure. Each campus had its own project even though they all used the same ERP software and exchanged expertise/ideas during implementation.

Institution (3) is a large university with six separate major campuses and several extension centers. The institution has a decentralized governance structure and the ERP project was a local implementation for each campus. Institution (4) is a large university with three separate campuses, a separate medical school and several extension centers throughout the state. The institution has a decentralized governance structure, but the ERP project was a very centralized one with one implementation for the entire institution. Institution (5) is a large university with a major campus and several minor satellite campuses and extension centers across the state. It has a centralized governance structure. The ERP project was one implementation for the entire organization.

Institution (6) is a large within a larger system that compromises twelve autonomous institutions. Each institution had its own autonomous ERP project even though they all chose the same ERP software vendor and there was a kind of central coordination for the projects. Institution (7) is a mid-size university with a major campus and two minor satellite campuses. There was one ERP project implementation for the entire institution. Institution (8) is a university with a large main campus and four minor satellite campuses in different locations. The institution had one centralized ERP implementation.

Institution (9) is a mid-size community college with two campuses (with an integrated governance structure). This institution performed a centralized ERP implementation. Institution (10) is a large university with two main campuses with an integrated governance structure in an urban area. The institution performed a single ERP implementation for the entire university. Institution (11) is a mid-size university with a single campus and a single ERP implementation project. Institution (12) is a large university with four campuses (with an integrated governance structure) in a metropolitan area. The institution had a centralized ERP implementation project. Institution (13) is a mid-size university with a large main campus and four outreach programs in four other cities. The university had a centralized ERP project.

34

2.6.2.2 Categorizing Institutions: Integration, Structure, and Maturity

The purpose of this section is to see if there is a classification system for higher education institutions that will allow us to understand ERP systems implementation. We are using criteria such as (1) degree of integration of the institution, (2) governance structure and (3) information technology deployment maturity levels to classify institutions.

- **Degree of Integration**

    Degree of integration refers to the structural organization of the institution. Some institutions have one campus compared to others with many campuses. Some institutions have colleges, divisions that are closely tied together while other institutions have divisions that are more or less autonomous in terms of administration and operations. This degree of integration has an impact of ERP systems implementation.

    An institution with three different campuses that function as three different universities of different sizes and missions has the choice of one implementation for all three campuses or three different implementations. Either choice has an impact of the implementation and project resources (human resources, funds, etc). An institution with a typical university campus on one side and a hospital/medical school on another side has the choice of one implementation or two different implementations. It will certainly be difficult to integrate the functions and operations of these two distinct entities and it will also be difficult to organize frequent meetings of project teams if campuses are in different locations.

- **Governance Structure**

    ERP systems implementation is about making the decision to implement an ERP system, selecting a specific software/vendor, and making all other decisions required to complete the project. The governance structure has an impact on the ERP project. Universities are ruled through different governance models: shared governance, corporate governance, and trustee governance. All universities practice all three forms of governance to some extent. However, the most common governance model among American universities is of shared governance. Decision-making is the prerogative of a large number of stakeholders

35

including not only university administrators, but also faculty, students and professional staff. The decision making process in such an environment can be very slow and this can impact the ERP project in a context of fast moving technologies. Universities are organized into administrative wings and academic wings. The academic wings that include colleges and teaching division are typically under the leadership of a Vice-President for Academic Affairs (also called Provost). The administrative wing is led by a Vice-President of Administration/Finance. The Chief Information Officer can be on either side depending on the institution. This administrative organization has an impact on project governance, choice of sponsor(s), implementation and success.

- **Technology Deployment Maturity**

Another criterion that could have allowed us to categorize different institutions of higher education is their maturity levels in terms of technology deployment. The concept of maturity level has been developed by the Software Engineering Institute at Carnegie- Mellon University. The CMMI can be used in the following three different areas of interest: 1) product and service development (CMMI for Development); 2) service establishment, management, and delivery (CMMI for Services); 3) product and service acquisition (CMMI for Acquisition). The different areas of the CMMI will apply to academic institutions as organizations that provide services, development information technology services for internal use and as institutions that acquire information technology services from outside vendors. The CMMI for Development applies to ERP projects in higher education. However, there is no documented case of academic institutions applying the CMMI (or portion of it) to improve their processes in the area of information technology or to acquire a major software application such as the ERP system. An application of the CMMI would have been beneficial for higher education institutions since ERP implementation is incremental and continuous with frequent developments and/or upgrades of modules. If academic institutions applied the CMMI in their deployment of the ERP system, it would have been easy to compare in a systematic way these institutions' abilities to implement ERP system and the impact of their maturity level on the ERP project.

36

2.6.3 Data Collection Method

2.6.3.1 Overview

Like most studies of ERP systems, we used qualitative research methods. The choice of qualitative methods can be explained by the importance of the human factor in ERP implementation. The qualitative research methodology is very useful and widely used in ERP research. It is particularly suitable to collect data in an environment where human factors, attitudes and behaviors are critical elements. We used a two parts method to collect data. First, we performed a search for institutions, projects, and project managers that performed ERP systems implementations. We collected relevant information on each institution, its ERP project, and the project manager. This information allowed us to prepare for interviews with the ERP project managers of these institutions. Information collected comprised of the following artifacts: general information about the institutions, project charter, project definition document, project plan, project organizational chart, and other project-related documents.

2.6.3.2 Documentary Sources and Interviews

We initially collected a large number of written and/or electronic resources for documentation about the ERP projects in higher education. We collected data through interviews with project managers. We chose to conduct semi-structured interviews because this method allowed us to collect more information. We interviewed the ERP project managers from selected academic institutions. The purpose of the interviews was to collect firsthand information about each project. To conduct the interviews for Institutions 1, 2, and 4, we made appointments and visited campuses to meet with the respective project managers. For institutions 5, 8, and 12, we met with the respective project managers on third party sites. We followed up with phone interviews to complete the data collection process. For the remaining institutions involved, it was not practical (distance and/or time) to meet with the project managers for interviews. We initiated and completed the data collection process through phone conversations. We conducted the interviews using a standard list of questions.

37

For each project, we created and maintained a data-collection file of information collected through research, face to face discussions, and phone interviews.

2.7 Analysis and Results

2.7.1 Overview of Data Analysis

All projects selected took place between the 1996 – 2009 timeframe. Most academic institutions started their projects in order to replace heterogeneous, aging and failing legacy systems. They wanted to avoid duplication of resources, data and effort. They wanted to document, streamline and standardize business processes and data collection/management in order to be more efficient in their operations. Some of the institutions prepared years. They documented their needs and businesses. Others did not. In most cases, the institutions could not anticipate the full scope and complexity of the project. In all cases, they had to deal with change management issues. They had to work with people to explain change, to prepare them and to help them go through all the changes. In all cases, they had to work on selling the project to their academic communities and to their project teams. They had to work on setting realistic expectations. In the same way, they had to struggle to maintain the project within scope in the face of multiple requests for customization or additional features. But each institution is a unique case in terms of: experience with large technology deployment, 2) use of technology, 3) financial and human resources, 4) local constraints. As such, each of them faces its challenges in its unique way. The greatest challenges for one institution are not necessarily the greatest for another institution.

2.7.2 Major Challenges faced by the Projects

The following section presents the challenges encountered by the different projects. All aspects of an ERP implementation present a considerable number of challenges. Below, we discuss the challenges considered the greatest by the project managers within the context of their projects, since each project has its own context, the challenges are different.

2.7.2.1 ERP Project Complexity and University Governance

All projects considered had to manage complexity related to the size of the institution, the number of campuses, the number of autonomous colleges, the number of ERP modules to be implemented, the number of people, the number of technologies, interfaces, methodologies and tools involved in the project. Multiple campuses represent problem because of different "institutions" with different sites within the institution. There is also a problem of logistics. The complexity of ERP project as well as the governance model of academic institutions presented serious challenges of the following projects: 1, 3, 4, 5, 9, and 12. For Institution 3, complexity came with the size of the project. Institution 12 had some challenges with the gigantic size of the project and its complexity in terms of people, resources, technology, modules to implement, and number of interfaces. For some institutions, complexity increased due to the number of campuses and independent divisions within the institution. Institution 1 has a traditional university and a hospital with a medical school that are completely different in terms of their internal structures and operations. Technically, it was not easy to integrate these two entities into one ERP implementation. Institution 4 had to implement one ERP system to fit the needs of three different campuses.

Institution 6 faced challenges in the area of governance. The challenge here is that ERP implementation in higher education works against the shared governance based on compromise. Shared governance and consensus building make the decision making process extremely slow, causing delays that do not help the implementation of fast moving technologies. Institution 4 had a problem of executive sponsorship turnover, losing the first executive sponsor of the ERP system to retirement and a second one to another institution. In a similar way, during the implementation of the ERP project, Institution 5 had three different presidents. The size and the complexity of an ERP project bring about challenges in the areas of communication. For Institutions 9 and 11, communication was a challenge because regardless of the channels of communication used and the amount of information sent, some people did not read or pay proper attention.

2.7.2.2 Change Management

Change management is a major issue for all ERP projects. This was especially true for projects 1, 2, 5, 6, 7, 12, and 13. It was hard to sell the idea of the ERP project to the community. People were afraid of the unknown, and the size of a project affecting the entire organization. They were afraid to know that their jobs would change and they would have to learn again. For Institution 1, change management was primarily about the community buy-in, bringing this community onboard and managing their expectations. Institution 2 also faced the user community's reluctance to switch their preference from the old system to the new system. For Institution 5, it was not easy to get the academic community involved in the project. In a similar manner, for Institution 6, change management was about the need to communicate and consult extensively with all parties within the institution. The institution had to control this approach. At Institution 7 and 12, the challenge was about building support and commitment through providing extensive training as appropriate for a smooth transition to the new system. At Institution 13, change management was about preparing the academic community to accept and adapt to the changes brought about by the ERP system. They did so through communication and training.

2.7.2.3 Scope Management and Customization

Scope management and customization presented some major challenges for the following projects: Projects 1, 4, 5, 6, and 8. At Institution 1, the problem was how to adapt business processes to the software and/or how to make the software integrate their processes. There was concern on the institution's side about the software's ability to handle the academic business. For Institution 4, the problem was managing expectations. To meet different user expectations, the project had to consider customizing the ERP system package because each unit wanted a specific functionality. At Institutions 5 and 6, the challenge was to deal with different requests for scope change or customization. The point was to avoid trying to make the new system do things the same way the old system used to do. These two institutions had the challenge of avoiding to make too much customization beyond the scope of the initial

plan. Project 8 received many requests from different departments for modifications, for third-party products, or for specific types of change beyond the initial scope of the project.

2.7.2.4 Continuing Support/Commitment

For a large number of ERP projects in higher education, it is very difficult to gain support and to maintain support and commitment throughout the many years it takes to implement. The following projects faced major challenges in this area: Projects 1, 4, 9, and 12. For Institution 1, it was maintaining different units of the institution engaged. For Institution 4, it was about making sure that the institution continued to fund the project. These concerns were true for Institutions 9 and 12. An ERP system implementation can take longer than three to four years with customization and addition of features. For Institution 9, the challenge was about garnering acceptance and support from the community. Institution 12 had a hard time gaining and maintaining the community's support throughout the duration of project.

2.7.2.5 Vendor/Consultant Management

Vendor/consultant management was a challenge for Projects 1, 4, and 10. For Institution 1, it was the ERP vendor not understanding the academic business and culture. It was about dealing with a large number of vendors/consultants with different goals in the course of a huge ERP implementation. At Institution 10, it was about the difficult relationship with the main vendor, who seemed to have different goals. This institution had the impression that the vendor's goal was to implement the system as expensively and as lengthy as possible.

2.7.2.6 Project/Resources Planning

Project planning was certainly a challenge for Projects 2, 3, 6, and 11. For Institution 2, the challenge was about determining the amount of money needed. It was hard to figure out how the project would run, how long it would take, how much resource would be needed. Like Institution 2, Institution 3 had no experience and no project charter/plan/culture. The technical and business teams were opposed to developing and using a project plan. At Institution 6, it was difficult to estimate money, human resources, and time needed to complete different tasks. Institution 11 could not develop a clear project plan. It was hard to

track what functional teams were doing because there was no clear outline about what they were to do. The institution experienced difficulties of getting the project team together with the right people as well.

2.7.2.7 Financial and/or Time Constraints

Projects 5, 7, 8, 11, 12, and 13 did not finish on time and on budget. Institution 5 had a finance/budget constraint. Cost control and cost containment were the drivers of the project. The project could not bring in consultants for as long as they needed them. Institution 8 had a fixed, non-negotiable budget. Running short of money would have caused deep trouble to the project. It was not possible to ask for additional money. For institution 7, 11 and 13, the time/schedule issue was tied to planning, budget and human resources issues. The number of employees capable of doing the job was limited. The same people were keeping things running on the functional sides. Funding for staff backfills in the functional units was inadequate. For Institution 8, the issue was about schedule/timeline. It was a challenge to deal with the normal cycle of academic activities. Institution 12 had a major schedule/time constraint. The institution wanted the ERP system to be implemented in a short period of time to take advantage of new technology and address growing needs as quickly as possible. The issue here was that, while focusing on the schedule, the project team lost sight of other important issues such as the budget.

2.7.2.8 Other Major Challenges

To a certain extent, business process management represented a challenge for most institutions. For institutions 7, 10 and 13, it was important to examine business processes and to find different ways to operate in order to be more effective. They wanted to define, refine, and improve business processes before starting the ERP implementation process.

Institution 2 faced a problem of lack of information about the software package selected for implementation. This university was one of the first institutions to implement an ERP system and the project team could not find information about the product in an academic setting. Institution 2 faced a challenge of technical incompatibility between the new ERP system and the existing communication/phone systems. The institution had to replace this

communication system. Institution 6 had to deal with the challenge of interfacing with state payroll system. Institution 9 faced the challenge of switching to the new system overnight. They did not want to run the old systems and the new systems in parallel. Institution 10 faced a challenge with legacy systems/data management. It was about migrating data from existing silos of information to the ERP system. The challenges above can by summarized in the following matrix:

Challenge	Institutions												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Complexity/University Governance	X		X	X	X	X			X			X	
Change Management	X	X			X	X	X					X	
Scope Management and Customization	X			X	X	X		X					
Continuing Support/Commitment	X			X					X			X	
Vendor/Consultant management	X			X						X			
Project/Resources Planning		X	X			X					X		
Financial and/or Time Constraints					X		X	X			X	X	X
Business Processes Management							X			X			X
Lack of Information on software package		X											
Technical Incompatibility		X											
Legacy systems/Data Conversion										X			
Switching to new system overnight									X				
Interface with state systems						X							

Table 2-5 : Summary of Institutions and Major Challenges

2.7.3 Minor Issues for each Institution

In the sections above, we discussed major challenges for each of the project. In addition to these challenges, all project managers reported minor problems. Project Managers 2 and 3 reported that data conversion was a difficult task which took a lot of time and money. Project Manager 4 reported some technical problems when different modules were released. Some features were not immediately available. Project Manager 5 mentioned quality assurance issues due to budget limitations that did not allow them to plan testing as appropriate. He also mentioned some difficulties finding qualified staff and some communication issues as well.

Project Manager 6 mentioned several minor challenges including time constraint related to fiscal year starting on July 1; loss of testing time/windows due to delays; loss of data conversion time due to delays; missing testing opportunity due to lack of qualified staff in the area of electronic payroll; communication issues related to peoples' desire to receive face to face personal communication instead of email; problem with skills and qualification of technical consultants brought in by vendor; staff issues related to keeping the legacy systems running while working on the ERP system at the same time. Project Manager 7 mentioned the difficulty of keeping two systems in operation for a transition period.

Project Manager 10 discussed some minor planning issues with the vendor who presented an implementation plan that didn't fit the needs of the institution. He also mentioned some integration issues between Human Resources and Payroll modules. The payroll system -- previously part of the financial system -- came to the Human Resources module; this caused problems with staff.

2.7.4 Local Factors that Impact ERP Projects

"Local factors" appear as a major finding of our fieldwork. Factors impacting ERP implementation can be classified into different categories. Parr et al (Parr et al., 1999) tried some kind of categorization:

> If one synthesizes the literature from implementation of large systems in general and from implementation or ERP systems in particular, the list of success factors is long. Some alleged

success factors are shown to be common to both; some are specific to information systems in general and some are specific to ERP implementation. (Parr et al., 1999).

In the limited context of this paper, ERP implementation challenges and issues can be grouped in three categories: general IT/ERP factors; higher education specific factors, project specific factors. The first category would refer to challenges that apply to all ERP projects. The second category would refer to challenges that are relevant only to ERP projects in higher education. This category would correspond to what Allen et al. (2002) called "contextual factors" in the area of public institutions and higher education institutions. These challenges could be termed "academic challenges" that are deeply rooted in the very nature of academic institutions.

In addition to these two categories, we identified a third category, "local challenges". These are challenges that are specific to each institution, have a great impact on ERP implementation choices, and play a critical role in the success of ERP project. The impact of "university governance model and culture" on ERP implementation is a challenge that is contextual or "academic". However, the impact of a "technical incompatibility with existing communication system" on the ERP project is a challenge that is local to Project 2. In the same way, the specific short implementation time imposed upon the project at Institution 12 is a local challenge. The fixed budget constraint imposed upon Project 5 at Institution 5 is a local factor. These local factors clearly indicate that each academic institution/project is unique.

2.7.5 Relationship Between Institutional Characteristics and Challenges

Considering Tables 2-4 and 2-5, it appears that there is a correlation between institutional characteristics and challenges. This is especially true for the following characteristics: size of the institution, number of distinct campuses, governance structure and project structure. A large institution with several distinct campuses is likely to face challenges in the area of complexity/university governance. This was the case for institutions 1, 3, 4, 5, 6, 9 and 12. The situation can be more difficult when the institution chooses centralized project

implementation. In these complex cases, institutions have to manage problems of logistics, coordination across campuses and standardization of the needs of the different campuses. With centralized project implementation, it is easier to coordinate and manage project resources, but logistical questions remain a challenge. With decentralized project implementation, logistical issues are managed locally, but there is duplication of effort across campuses and loss of resources. Further investigation of institutional characteristics and the relationship between challenges and these characteristics is needed in order to reach solid conclusions.

2.8 Discussion .

The purposes of this paper were threefold: (1) Identify and categorize the issues and challenges identified in the recent literature on the implementation of ERP in general and in the higher education sector in particular; (2) Find out issues and challenges perceived by managers working in the higher education sector during the implementation of their ERP projects; and (3) Compare the results of (1) and (2) to show how the issues and challenges identified by managers in higher education could help in the implementation of ERP in general.

2.8.1 Revisiting other Studies on ERP Implementation

In the category of literature on theories and models that tried to identify conditions to make ERP systems implementation more successful, we selected and reviewed a representative sample of ten studies: Arinze et al. (2003), Basu et al. (2003), Bradford et al. (2003), Huin (2004), Luo and Strong (2004), El Amrani et al. (2006), Ifinedo (2006), Vilpola (2008), Lea et al. (2005), Morton and Hu. We grouped the CSFs in the following categories: 1) Project management/strategy, 2) Project resources and organizational issues, Technical issues (Table 1). This review showed that the largest number of CSFs fall in the "Project management/strategy" category. It shows that the most frequent CSFs are: obtain top

management support, provide project management, manage project complexity, provide project team/champion, define project plan vision/goals, provide project communication, define and manage business processes, provide change management, define ERP customization, and define project requirements.

In the category of studies that are self-declared systematic discussions of critical success factors (CSFs), we selected and reviewed a representative sample of six studies: Parr et al. (1999), Somers et al. (2000) Brown and Vessey (2003) Umble et al. (2003), Al-Mashari et al. (2003), and Nah et al. (2001). Once again, we grouped the CSFs in the following categories: 1) Project management/strategy, 2) Project resources and organizational issues, Technical issues (table 2). The review showed that the largest number of CSFs falls in the "Project management/strategy" category. It showed almost the same most frequent CSFs mentioned above. This review showed that technical issues were important particularly in the area of legacy systems/data conversion and software customization. This review allowed us to understand ERP implementation issues in general and find out the most frequent ERP implementation challenges.

2.8.2 Revisiting Studies on Higher Education

Literature reviews by Esteves-Souza and Pastor-Collado (2007), Botta-Genoulaz et al. (2005) and Moon (2007) showed that there is a limited number of studies on ERP implementation in higher education. To present the state of the art, we reviewed studies by Pirani et al. (2002), McCredie and Updegrove (1999), Furumo et al. (2004), Scott and Wagner (2003), Cornford and Pollock (2004), Babaa'i (2009), Voloudakis (2002), Allen et al. (2002, and Nielsen (2003). These studies were not concerned about identifying and classifying critical success factors in general terms. Their goal was to prove that higher education institutions are different and have specific needs in terms of ERP implementation. While trying to show how ERP implementation CSFs identified in the literature on corporate implementation apply to academic institutions, they tried to point out higher education specific factors. Review of these studies showed that most frequent ERP implementation CSFs identified (such as: provide top management support, provide project management, manage project complexity,

47

provide project team/champion, define project plan vision/goals, provide communication, define and manage business process, provide change management, define and manage software customization, and define project requirements) in the literature on corporate implementation apply to higher education. Consequently, the broad CSFs categories (Project Resources and Organizational Issue, Project Management/Strategy, Technical Issues) that we presented in tables 1 and 2 apply to higher education. However, additional higher education specific CSFs identified in the literature allowed us to add an additional category (higher education specific CSFs) that we presented in table 3. This review allowed us to understand ERP implementation issues.

2.8.3 Points of Divergence and Convergence

A comparison of our study with studies considered in the literature review allowed us to establish points of convergence as well as points of divergence.

2.8.3.1 Points of Convergence

Previous studies on ERP systems in higher education 1) documented ERP systems in academia; 2) presented lessons learned, and 3) pointed out differences between universities and other organizations that implement ERP systems. Our study concurs on these aspects. Our lessons learned confirm the relevance of some lessons learned in previous studies. Several challenges identified in our study clearly correspond to some critical success factors in the research literature. Such is the case of factors presented in the different categories of Tables 1, 2 and 3 in the literature review. These are project resources/organizational, project management/strategy, technical issues and higher education specific issues.

McCredie and Updegrove (1999) presented twenty-two recommendations that are actually lessons learned from case studies. A number of these recommendations directly relate the challenges and issues identified in our study. Our study confirms and validates these recommendations by McCredie and Updegrove. The deployment lessons by Pirani et al. (2002) are confirmed by our study as well. Lessons learned by Voloudakis (2002) relate to challenges and issues identified by our study in the areas of project leadership, governance,

48

project planning, executive sponsorship and involvement, scope management/customization, and vendor/consultant relationship management. The major causes of success or failure in the cases studied by Furumo et al. (2004) confirm challenges and issues identified by our study in the area of change management.

Most of the studies about ERP systems implementation in higher education consistently identify and emphasize critical factors. These factors can be summarized as follow: mission of the institution, business and operations, organizational structure, culture, decision making process, calendars, change management and vendors/consultants relationship management. Academic organizations have a distinctly dissimilar business model, utilizing dissimilar operations. These fundamental differences directly and profoundly impact ERP systems operations and implementations when designed for these academic institutions as compared to those designed for most other businesses. Our study confirms the specific nature of academic institutions since some challenges relate to this specific nature.

2.8.3.2 Points of Divergence

Our fieldwork allowed us to identify additional issues not discussed in the literature. Project Manager 4 mentioned technical problems/deficiencies within different modules of the ERP package. Project Manager 7 mentioned the following problems: 1) insufficient staff for running two information systems in parallel during a transition period; 2) synchronizing data in two systems running in parallel. All projects mentioned constraints related to the academic calendar (the semester system) for the implementation process. They all had to finish tasks or reach milestones before the beginning or end of a semester. All projects mentioned a problem of availability and use of non-dedicated staff time at some point during the semester when these staff members had to spend time on their regular jobs. All projects mentioned some difficulty with the consensus-based decision-making process. Project Manager 2 mentioned a problem of lack of neutral information about the ERP software package. Project Manager 9 mentioned a problem with the overnight switch to the new ERP system. Unpredictable local factors, politics, power struggle, decision-making and choices are unique within the context of each project. Further investigation is needed to verify the frequency of these issues to see if they can be considered CSFs.

49

2.8.4 Additional Categories to the PMBOK to classify CSFs

The PMBOK comprises the following knowledge areas: project integration management, project scope management, project time management, project cost management, project quality management, project human resource management, project communications management, project risk management, project procurement management. Review of ERP implementation challenges and issues allowed us to group the CSFs in the different categories of the PMBOK. However, all CSFs do not find a category in the PMBOK. The PMBOK is a generic project management framework not specific to any industry sector or domain. It stays generic so that it can account for all projects in all fields including civil engineering, mechanical engineering, software engineering, etc. Being generic, the PMBOK cannot account for all CSFs, particularly those CSFs that are specific to information technology/systems project, a specific domain/sector or a specific project. In the specific context of our study, the PMBOK cannot account for issues that are specific to information technology, higher education institutions or to a given project. We added further categories to the knowledge areas of the PMBOK to account for ERP implementation issues as shown in this Table 6:

CSFs Categories
Project Integration Management Factors
Project Scope Management Factors
Project Time Management Factors
Project Cost Management Factors
Project Quality Management Factors
Project Human Resource Management Factors
Project Communications Management Factors
Project Risk Management Factors
Project Procurement Management Factors
Technical/IT (ERP) Specific Factors
Domain/Sector Specific Factors
Local/Project Specific Factors

Table 2-6 : PMBOK-based CSFs Classification

50

Our study placed the project manager and the project management function at the center of the ERP system implementation process. This focus on the project management and the project manager allowed us to capture the big picture within the context of ERP system implementation as project managers who play a critical role. Our study appears as the first study of ERP implementation issues and challenges from project managers' standpoint.

It important to pay attention to three categories of challenges/CSFs that our study pointed out: technical/IT specific factors, domain specific issues and local/project specific issues. It is important to pay attention to technical/IT specific factors because ERP projects involve a considerable amount of information technology hardware, software and methodologies. It is a major information technology project. The project team needs to be knowledgeable not only in project management or in the higher education domain, but needs to have a strong grasp of information technology, specifically ERP software and methodologies, and the hardware involved. The project team must pay special attention to domain specific issues because ERP projects in higher education are different from civil engineering or mechanical engineering projects. Even though these projects will draw on general project management knowledge, each team needs to know the idiosyncrasies of the application domain to gain and stay in control. Domain knowledge is crucial. Local/project specific issues are equally important because each project has its own constraints that information technology and project management expertise will not allow the project team to handle. It is critical for the project team to be aware of the specific challenges.

2.9 Limits and Future Research

Working on thirteen projects at thirteen different institutions was beneficial. However, we had to limit our field work to project managers who accepted our interview. We limited our study to the standpoint of the ERP project managers. This is our methodological choice. However, this choice gave us only the standpoint of the project manager, excluding other perceptions and perspectives on ERP project management. A study that takes into account

51

information from various staff members on ERP projects will provide diverse perspectives on the issues.

Many PMs that we interviewed were not actually in the project management role at the time of the interview. They had already completed their projects. This is a limitation. Their assessments of issues and challenges were based on their memory. Maybe, these assessments would have been different while they were on the project or at the end of the project. Some of the PMs were in action at the time of our interviews. Their assessments may reflect immediate contingencies. They may have different assessments later, when they have completed the project. Future studies research avenues include: systematic comparison of ERP implementation in the corporate world and in higher education; comparison or ERP implementation in different industries and services; dedicated studies on ERP project communication, management of data conversion and legacy systems, ERP Project training issues, ERP project quality assurance, ERP project budgeting and finance. It is equally important to study the impact of politics and power struggle on ERP projects in higher education; ERP projects in private vs. public universities; ERP projects in American universities versus projects in academic institutions in other countries in North America, Europe and other places. It would be a very useful task to investigate how process improvement models (such as the CMMI) could be applied of ERP implementation in higher education.

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2.11 Appendix 1: Interviews Excerpts

Project Manager 2:

"We run into a problem of inability of our in place touchtone telephone system to accommodate our new system. We had to completely replace that".

Project Manager 3:

"We had no culture of project management on campus. When I started development project management techniques and project planning, I had total opposition from the technical side and the business side developing and using a project plan. Nobody thought it was useful and worthwhile and they did not want to do it. And that was a major problem. This was one of the greatest challenges. The major job of a project manager is to manage the critical path. I had to manage the project without the benefits of a critical path, without a formalized project plan".

Project Manager 6 :

"The greatest challenge is the fact that universities are governed through consensus, discussion and compromise so to speak toward a solution. ERP systems don't give the level of flexibility to support that model. Our institution is a research university. It is a faculty centered campus. We have a very, very strong faculty governance. We like to be collaborative and we like to work through the groups that we have in terms of shared governance. ERP implementation in higher education works against that model of shared governance through compromises. And so the challenge with ERP systems is being able to build consensus on the degree of change that people are willing to take versus the degree of risk that the institution is willing to take if you modify the system to minimize the change. The constant challenge is trying to balance those two issues. You have to do a lot of discussion, communication with faculty and staff to convince of the necessity to change business processes."

Project manager 6:

"With Finance and HR (modules) we did a lot of modification to meet state requirement about how we do payroll. It had to be an interface to the state. There was way too much customization in those systems. Those customizations turn out to be a longtime nightmare. Each time the vendor makes an update, you need to re-work the updates into your customization. After we went live, we struggled and we spent about three years de-customizing a lot of the system."

Project manager 7:

"Time management was an issue. All the staff involved had their real jobs. No one has taken over that responsibility. And you come along and you ask them to help find out how to implement the ERP system and how to make it work for the best interest of the university. The staff members involved in the project have two full time jobs. This is an incredible stress for the people involved in the project."

Project Manager 7:

"The second thing is it is very difficult to get the people think outside the box, to think about different ways to do something. If you ask them why do you do it this way, the typical response is: we have to. You find out that there is no state regulation or federal law that requires that they do it that way. They have never done it any other way. One of the challenges is to break the box and make the people thing about different ways they can do this".

Project manager 11:

"Getting the team together was also a challenge because we had to make sure we had the right people. For example, on our student team, we had our registrar be the student lead, but he had all these day-to-day operations that he had to do too. We had to hire backfill, and how do we fund that during the duration of the project? And we had to do that throughout the

campus. How do we manage the backfill and the dollars that go along with it. This was one of the most expensive portions of the project."

Project Manager 12:

"The project is so big, so complex. How do you make sure that you have thought about all the aspects of the project? How do you make sure that you have all the details? You need to have the experience or you need to have someone with the experience with you to work on planning all the details. How far down do you go into the details? You have thousands and thousands of tasks for the implementation. Having some experience planning the project details is critical."

2.12 Appendix 2: Questionnaire

This appendix presents the list of question used for the semi-structured interviews with ERP project managers.

Questions:
- Please, provide some background on the ERP Project
- Please, provide some background information on project management issues
- What are the greatest challenges of ERP implementation in Higher Education?
- What are the challenges--if any—in the area of project planning, monitoring, and control?
- What are the challenges--if any—in the area of project scope management?
- What are the challenges--if any—in the area of project time/schedule management?
- What are the challenges--if any—in the area of cost/budget management?
- What are the challenges--if any—in the area of project quality assurance issues/management?
- What are the challenges--if any—in the area of staffing/human resources management?

- What are the challenges--if any—in the area of project communication management?
- What are the challenges--if any—in the area of project risk management?
- What are the challenges--if any—in the area of project acquisition/vendors/consultants relationships management?
- What are the challenges--if any—in the area of legacy systems?

Chapitre 3 : Les projets ERP en milieu universitaire : les tactiques et les défis au niveau des ressources humaines

3.1 Résumé

Cet article analyse les tactiques et les défis liés à l'acquisition et à la gestion du personnel dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire. La littérature indique que les ressources humaines occupent une place cardinale dans la mise en œuvre des systèmes ERP dans l'enseignement supérieur, un secteur qui est spécifique sur les plans de son organisation, de ses activités, de sa culture et de ses contraintes. Cependant, aucun article n'a été exclusivement consacré à ce sujet. La présente étude -- portant sur treize projets ERP menés par des organisations universitaires des États-Unis -- conclut que, comme tactiques d'acquisition et de gestion du personnel, les institutions utilisent une combinaison de talents internes et externes qui travaillent à plein temps et/ou à temps partiel sur le projet. Ces institutions utilisent différentes tactiques pour attirer et conserver le personnel pendant toute la durée du projet. La présente étude évalue ces conclusions et propose des scénarios d'acquisition du personnel qui pourraient être utiles dans le cadre de la mise en œuvre des systèmes ERP aussi bien en milieu universitaire que dans d'autres milieux.

3.2 Commentaires

Ce chapitre n'a pas encore été soumis à une revue pour publication. L'idée de base de cet article m'est venue en voulant découvrir et documenter les stratégies et les défis liés à l'acquisition et à la gestion du personnel dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire. Après avoir consulté les professeurs Marc Frappier et Jean Ethier pour recueillir leurs avis et suggestions, j'ai mené le travail d'enquête sur le terrain et j'ai rédigé la première ébauche de l'article. L'apport principal de cet article est 1) d'identifier les stratégies et les défis liés à l'acquisition et à la gestion du personnel dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire et 2) de placer l'étude des questions liées aux ressources humaines des projets ERP dans le cadre de la gestion de projet.

ERP Projects in Higher Education: Staffing Tactics and Challenges

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3.3 Abstract

This paper is a study of human resources' issues and challenges faced by institutions in the higher education sector as they implement ERP systems. Literature indicates that human resources hold a cardinal position in ERP systems' implementation in higher education, a sector that is specific in terms of organization, operations, culture and constraints. However, no article has been exclusively dedicated to this topic. Our study of thirteen universities ERP projects throughout the United States finds that, in their staffing tactics, institutions use a combination of internal and external talents that work full time and/or part time on the project. They use different tactics to attract and maintain staff throughout the duration of the project. Our study evaluates these findings and proposes staffing scenarios that could be useful to ERP implementation project not only in the higher education sectors but in others as well.

3.4 Introduction

ERP projects are major information system projects that profoundly transform organizations, as they integrate and automate many organizational functions. They were initially developed for the manufacturing sector, with Manufacturing Resource Planning (MRP and MRP II) inventory systems (Rachid et al., 2002; Jacobs and Weston, 2006). In manufacturing, ERP systems integrate and automate disparate functions, such as supply chain, production management, financial, accounting, and human resource management. After success in manufacturing operations, use for ERP systems soon extended to other sectors, including non-manufacturing corporations, public administrations, and academic institutions. In these

62

new sectors, ERP systems are essentially used as tools for accounting, finance, human resources, and customer-relations management.

Even after several decades of practice, implementing ERP systems still remains a challenging endeavor (Esteves-Souza and Pastor-Collado, 2000, 2001, 2007; Brown and Vessey, 2003; Umble et al., 2003; Al-Mashari et al., 2003; Soja, 2006). This conclusion applies particularly to the implementation of ERP in higher education (Updegrove, 1999); Furumo et al, 2004; Cornford and Pollock, 2004); and Babaa'i (2009)), a sector marked by great complexity of managing some peculiarities related to governance, decision making and culture. Just like studies on the implementation of ERP in general, those on implementation in higher education have shortcomings. For example, no study has focused on ERP project staffing tactics and challenges perceived by project managers. However, information from this source could certainly make some contribution and may enable more successful implementation of ERP in this sector and in others. This study attempts to fill this gap by pursuing three objectives: (1) point out the current state of discussions of staffing tactics and challenges in the literature; (2) identify staffing tactics and challenges perceived by managers working in the higher education sector during the implementation of their ERP projects; (3) establish a table of staffing scenarios and a matrix of staffing tactics for ERP implementation in higher education that could help ensure greater success in ERP systems' implementation in general.

3.5 Literature Review

3.5.1 Overview

ERP literature reviews by Esteves-Souza and Pastor-Collado (2007), Botta-Genoulaz et al. (2005) and Moon (2007) do not cover the study of staffing/human resources tactics and issues for ERP implementation. This topic is typically addressed in studies discussing ERP critical success factors (CSF), which we cover in the next section.

3.5.2 Review of Literature on CSFs

This literature on ERP critical success factors always mentions staffing. We consider below nine major studies on CSFs to verify this fact. Parr et al. (1999) provided a list of CSFs including "best people fulltime", and "balanced team". The authors believed that the institution should release the most experienced business and technical staff to work with consultants on the project full time. Holland et al. (1999) provided two categories of CSFs: strategic and tactical. In this study, project staffing expressed in terms of "personnel" was the second tactical CSF. "Personnel" refers to the "the project team, including consultants, top internal staff from functional business areas, and a change manager." (Holland et al. (1999).

In a study based on an analysis of seven corporate organizations, Sumner (1999) established a list of critical success factors for each organization. CSFs for all of these corporate organizations included staffing tactics and issues. CSFs for the first company (Monsanto) included the use of "external consultants" which is part of project staffing tactics. "External consultants" are technical, and business areas' experts from outside the institution. CSFs for the second company (Anheuser Busch Companies) included "Maintain excellent staffing, both by developing internal personnel and by using external consultants"; and "Obtain and retain team members with knowledge of the business processes, as well as an understanding of the technical aspects". CSFs for the third company (Sigma Chemical) included: "Use a mix of consultants and internal staff to work on the project team, so that internal staff members can "grow" the necessary technical skills for SAP design and implementation". CSFs for the fourth company (Boeing Company) did not mention directly project staffing, but "Make a commitment to training and re-skilling technical professionals" and "Train, train, train". CSFs for the fifth company (Edward Jones Company) included: "Recruiting and retaining "key" PeopleSoft people". "Key PeopleSoft people" refers to external staff with expertise in the ERP software application that is PeopleSoft. CSFs for the sixth company (Edward Jones Company) were the following ones: "Don't add people to a project, if it is already behind schedule", "Obtain consultants who are specialists in specific application modules", "Understand and appreciate the criticality of high-tech worker

turnover, recruitment, and retention issues". CSFs for the seventh company (Emerson Electric Company) included: "Maximize use of consultants".

Esteves-Sousa and Pastor-Collado (2000) presented a unified CSFs model comprising strategic and tactical factors. Strategic CSF: "Adequate project team composition" and tactical CSFs: "Dedicated staff and consultants" and "appropriate usage of consultants" were part of staffing tactics. Esteves-Sousa and Pastor-Collado (2000) stated that ERP project teams should include members from business units, information technology, vendors and consultants organizations. They pointed out the importance of integrating third party consultants in the project teams and retaining relevant ERP knowledge within the organization. (Esteves-Sousa and Pastor-Collado, 2000).

Nah et al. (2001) presented a list of CSFs including "ERP teamwork and composition" which is a staffing issue. Nah et al. (2001) contended that project team which is important throughout the ERP life cycle should be a cross-functional team including the best people in the organization. (Nah et al., 2001).

Somers & Nelson (2001) provided a list of CSFs including "Project team competence" and "Use of Consultants". These two CSFs were related to staffing. For these authors, the business and technology competence of the project team was a critical factor for project success or failure and this competence was much needed during earlier stages of the project (Somers & Nelson, 2001).

Brown and Vessey (2003) established an ERP implementation contingency framework comprising a list of CSFs. These CSFs included "composition and leadership of the project team", and "usage of 3rd party consultants". These two referred to project staffing. A list of CSFs by Umble et al. (2003) includes "great implementation team". These authors presented project staffing as a key factor. For Umble et al. (2003), considering the importance of the project team for project success, it was critical to have on board top-notch staff chosen for their expertise/skills and known past accomplishments (Umble et al., 2003).

Gargeya and Brady (2005) provided a list of CSFs including "project team/management support/consultants". This CSF clearly underlines the importance of staffing for ERP project. These authors stated that a successful project team was one that was

cross-functional, comprised knowledgeable people in the organization, and was dedicated entirely to the project (Gargeya & Brady, 2005).

All of these studies on ERP implementation discussed above underlined the importance of human resources/staffing issues. Table 1 below summarizes staffing related critical success factors.

Staffing-related CSFs	Author(s)
Compose project team and leadership taking into account business application and technical knowledge.	Brown & Vessey (2003)
Compose adequate project team composition with business and technical staff and consultants.	Esteves & Pastor (2000)
Compose the project team with the best people in the organization and with consultants.	Nah et al. (2001)
Put in place a great implementation team composed of top-notch people who are chosen for their skills, past accomplishments, reputation, and flexibility.	Umble et al. (2003)
Project team (including consultants), cross-functional, consisting of the most knowledgeable people in the organization, dedicated solely to the project	Gargeya & Brady (2005)
Use the best people full time on the project team.	Parr et al. (1999)
Project team should have business and technological competence	Somers & Nelson (2001)
(Maximize) use/usage of (3rd party) consultants	Somers & Nelson (2001); Brown & Vessey (2003); Sumner (1999)
Project personnel/team should include consultants, top internal staff from functional business areas, and a change manager	Holland et al. (1999)
Maintain excellent staffing, both by developing internal personnel and by using external consultants.	Sumner (1999)
Use a mix of consultants and internal staff to work on the project	Sumner (1999)
Difficult to recruit and retain good technical people because of market rates	Sumner (1999)
Recruiting and retaining "key" ERP software people	Sumner (1999)
Understand and appreciate how critical high-tech worker turnover, recruitment, and retention issues are.	Sumner (1999)

Table 3-1 : Summary of Staffing related CSFs

Staffing tactics and issues can be related to different project phases and could require mobilizing resources inside or outside the institution. Project phases include "Pre-Implementation", "Implementation" or "Post-implementation". Table 3-2 tries to determine whether a specific issue or tactic requires internal and/or external solution and the project

66

phase in which the issue or tactic belongs. Internal staffing tactics are tactics that find human resources solutions within the institution. External tactics are tactics that rely on outside solutions. The "Pre-Implementation" phase consists of the project feasibility study and the project planning. The "Implementation" phase starts when all the logistics and resources are in place and the project is carried out. The "Post-Implementation" phase starts when the project implementation is over and the system is in production. Table 2 below reframes staffing critical success factors presented in Table 1.

		Degree of precision concerning implementation's phases	
		Phase non specific	Phase specific
Staffing Source	Specific	Brown and Vessey (2003) Holland et al. (1999) Sumner (1999) Parr et al. (1999)	Nah et al. (2001) Somers & Nelson (2001) Esteves & Pastor (2000)
	Non specific	Gargeya and Brady (2005)	Umble (2003)

Table 3-2 : Project Staffing Sources at Different Implementation Phases

In connection with themes related to implementation phases and required staffing source, most studies have either shown general success factors or covered only one of the topics. Only three studies pointed out success factors that made reference to both implementation phases and staffing source.

3.5.3 Summary

This literature is abundant, particularly in the area of factors that impact project success. CSFs are well documented. This literature covers implementation in a wide range of domains, industries and countries. All of these studies dedicated to CSFs underlined the

importance of staffing and human resources issues for ERP implementation projects. On the weaknesses side, one must note that no study of ERP implementation in the corporate world as well as in higher education is dedicated to human resources/staffing tactics and issues. This topic is generally mentioned in the list of CSFs and discussed in one or two paragraphs. Most of these studies typically focused on one or two projects only. Results of these studies are sometimes inconclusive or imprecise since they are not based on large samples and they did not focus on staffing issues. They do not discuss different staffing tactics/issues as they relate to different project phases. They do not provide detailed information about actual management of human resources during the project. These strengths and weaknesses of the literature clearly indicate the need and the opportunity for more research on ERP implementation staffing tactics and issues in higher education.

3.6 Methodology & Research Design

3.6.1 Theoretical and Conceptual Framework

ERP systems implementation can be studied within the framework of project management. We consider the Project Management Body of Knowledge (PMBOK) development by the Project Management Institute as the reference. We articulated our thought and our research questions for this study using the PMBOK as reference framework. We use this framework because ERP systems implementation is a project management enterprise and research literature (particularly on critical success factors) points out the importance of project management.

3.6.2 Projects/Institutions Considered

3.6.2.1 The Selection Process

We used the Internet to search for academic institutions that have implemented or were implementing ERP systems. We used the website of major higher education ERP software

vendors and ERP software users groups to find information about academic institutions using ERP systems. These different searches allowed us to establish a list of institutions. Then, we used the web to search for the project managers of these institutions. We prepared and sent e-mails to fifty project managers to ask for interviews with them. Of these, twenty-six responded and thirteen accepted our interviews. We ultimately focused our study on these thirteen projects. All selected projects claimed to have been successful because their systems were up and running. In this paper, we refer to these projects as Projects 1 through 13. Similarly, we refer to a project's institution as Institution x, and to its project manager as Project Manager X. The following table provides a brief summary of the characteristics of the institutions selected.

Institution	Size (Number of students, estimates)	Number of distinct campuses	Governance structure / Project structure	Project timeframe
Institution 1	~ 40,000	3 (plus an autonomous medical school)	Decentralized/Centralized	1996-2001
Institution 2	~ 42,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 3	~ 40,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 4	~ 70,000	4 (plus several extension centers	Decentralized/Centralized	2000-2005
Institution 5	~ 21,000	1 (plus several extension centers)	Centralized/Centralized	2001-2003
Institution 6	~ 12,000	12 (plus several extension centers)	Decentralized/Decentralized	2001-2005
Institution 7	~ 14,000	1 (plus several extension centers)	Centralized/Centralized Project	2003-2006
Institution 8	~ 18,000	1 (plus four satellite campuses)	Decentralized/Centralized Project	2003-2007
Institution 9	~ 10,000 (65%	1 (with 2 urban	Centralized/Centralized	2004-2008

	part time)	campuses)	Project	
Institution 10	~ 32,000	1 (with 2 urban campuses)	Centralized/Centralized Project	2004-2007
Institution 11	~ 8,000	1	Centralized/ N/A	2005-2008
Institution 12	~ 60,000	1 (with 4 urban campuses)	Centralized/Centralized Project	2006-2007
Institution 13	~ 13,000	1 (plus 4 outreach programs)	Centralized/Centralized Project	2006-2009

Table 3-3 : Basic Information about Institutions Analyzed

Institution (1) is a large university with two separate and autonomous campuses, a medical campus, and a decentralized governance structure. The ERP project was a centralized implementation for the entire institution. Institution (2) is a large university with seven separate major campuses and several minor campuses and extension centers. The institution has a decentralized governance structure. Each campus had its own project even though they all used the same ERP software and exchanged expertise/ideas during implementation.

Institution (3) is a large university with six separate major campuses and several extension centers. The institution has a decentralized governance structure and the ERP project was a local implementation for each campus. Institution (4) is a large university with three separate campuses, a separate medical school and several extension centers throughout the state. The institution has a decentralized governance structure, but the ERP project was a very centralized one with one implementation for the entire institution. Institution (5) is a large university with a major campus and several minor satellite campuses and extension centers across the state. It has a centralized governance structure. The ERP project was one implementation for the entire organization.

Institution (6) is a large within a larger system that compromises twelve autonomous institutions. Each institution had its own autonomous ERP project even though they all chose the same ERP software vendor and there was a kind of central coordination for the projects. Institution (7) is a mid-size university with a major campus and two minor satellite campuses. There was one ERP project implementation for the entire institution. Institution (8) is a

university with a large main campus and four minor satellite campuses in different locations. The institution had one centralized ERP implementation.

Institution (9) is a mid-size community college with two campuses (with an integrated governance structure). This institution performed a centralized ERP implementation. Institution (10) is a large university with two main campuses with an integrated governance structure in an urban area. The institution performed a single ERP implementation for the entire university. Institution (11) is a mid-size university with a single campus and a single ERP implementation project. Institution (12) is a large university with four campuses (with an integrated governance structure) in a metropolitan area. The institution had a centralized ERP implementation project. Institution (13) is a mid-size university with a large main campus and four outreach programs in four other cities. The university had a centralized ERP project.

3.6.2.2 Categorizing Institutions: Integration, Structure, and Maturity

The purpose of this section is to see if there is a classification system for higher education institutions that will allow us to understand ERP systems implementation. We are using criteria such as (1) degree of integration of the institution, (2) governance structure and (3) information technology deployment maturity levels to classify institutions.

- **Degree of Integration**

Degree of integration refers to the structural organization of the institution. Some institutions have one campus compared to others with many campuses. Some institutions have colleges, divisions that are closely tied together while other institutions have divisions that are more or less autonomous in terms of administration and operations. This degree of integration has an impact of ERP systems implementation.

An institution with three different campuses that function as three different universities of different sizes and missions has the choice of one implementation for all three campuses or three different implementations. Either choice has an impact of the implementation and project resources (human resources, funds, etc). An institution with a

71

typical university campus on one side and a hospital/medical school on another side has the choice of one implementation or two different implementations. It will certainly be difficult to integrate the functions and operations of these two distinct entities and it will also be difficult to organize frequent meetings of project teams if campuses are in different locations.

- **Governance Structure**

ERP systems implementation is about making the decision to implement an ERP system, selecting a specific software/vendor, and making all other decisions required to complete the project. The governance structure has an impact on the ERP project. Universities are ruled through different governance models: shared governance, corporate governance, and trustee governance. All universities practice all three forms of governance to some extent. However, the most common governance model among American universities is of shared governance. Decision-making is the prerogative of a large number of stakeholders including not only university administrators, but also faculty, students and professional staff. The decision making process in such an environment can be very slow and this can impact the ERP project in a context of fast moving technologies. Universities are organized into administrative wings and academic wings. The academic wings that include colleges and teaching division are typically under the leadership of a Vice-President for Academic Affairs (also called Provost). The administrative wing is led by a Vice-President of Administration/Finance. The Chief Information Officer can be on either side depending on the institution. This administrative organization has an impact on project governance, choice of sponsor(s), implementation and success.

- **Technology Deployment Maturity**

Another criterion that could have allowed us to categorize different institutions of higher education is their maturity levels in terms of technology deployment. The concept of maturity level has been developed by the Software Engineering Institute at Carnegie- Mellon University. The CMMI can be used in the following three different areas of interest: 1) product and service development (CMMI for Development); 2) service establishment,

management, and delivery (CMMI for Services); 3) product and service acquisition (CMMI for Acquisition). The different areas of the CMMI will apply to academic institutions as organizations that provide services, development information technology services for internal use and as institutions that acquire information technology services from outside vendors. The CMMI for Development applies to ERP projects in higher education. However, there is no documented case of academic institutions applying the CMMI (or portion of it) to improve their processes in the area of information technology or to acquire a major software application such as the ERP system. An application of the CMMI would have been beneficial for higher education institutions since ERP implementation is incremental and continuous with frequent developments and/or upgrades of modules. If academic institutions applied the CMMI in their deployment of the ERP system, it would have been easy to compare in a systematic way these institutions' abilities to implement ERP system and the impact of their maturity level on the ERP project.

3.6.3 Data Collection Method

3.6.3.1 Overview

Like most studies of ERP systems, we used qualitative research methods. The choice of qualitative methods can be explained by the importance of the human factor in ERP implementation. The qualitative research methodology is very useful and widely used in ERP research. It is particularly suitable to collect data in an environment where human factors, attitudes and behaviors are critical elements. We used a two parts method to collect data. First, we performed a search for institutions, projects, and project managers that performed ERP systems implementations. We collected relevant information on each institution, its ERP project, and the project manager. This information allowed us to prepare for interviews with the ERP project managers of these institutions. Information collected comprised of the following artifacts: general information about the institutions, project charter, project definition document, project plan, project organizational chart, and other project-related documents.

3.6.3.2 Documentary Sources and Interviews

We initially collected a large number of written and/or electronic resources for documentation about the ERP projects in higher education. We collected data through interviews with project managers. We chose to conduct semi-structured interviews because this method allowed us to collect more information. We interviewed the ERP project managers from selected academic institutions. The purpose of the interviews was to collect firsthand information about each project. To conduct the interviews for Institutions 1, 2, and 4, we made appointments and visited campuses to meet with the respective project managers. For institutions 5, 8, and 12, we met with the respective project managers on third party sites. We followed up with phone interviews to complete the data collection process. For the remaining institutions involved, it was not practical (distance and/or time) to meet with the project managers for interviews. We initiated and completed the data collection process through phone conversations. We conducted the interviews using a standard list of questions. For each project, we created and maintained a data-collection file of information collected through research, face to face discussions, and phone interviews.

3.7 Analysis and Results

3.7.1 Overview of Data Analysis

All projects selected took place between the 1996 – 2009 timeframe. Most academic institutions started their projects in order to replace heterogeneous, aging and failing legacy systems. They wanted to avoid duplication of resources, data and effort. They wanted to document, streamline and standardize business processes and data collection/management in order to be more efficient in their operations. Some of the institutions prepared years. They documented their needs and businesses. Others did not. In most cases, the institutions could not anticipate the full scope and complexity of the project. In all cases, they had to deal with change management issues. They had to work with people to explain change, to prepare them and to help them go through all the changes. In all cases, they had to work on selling the

project to their academic communities and to their project teams. They had to work on setting realistic expectations. In the same way, they had to struggle to maintain the project within scope in the face of multiple requests for customization or additional features. But each institution is a unique case in terms of: experience with large technology deployment, 2) use of technology, 3) financial and human resources, 4) local constraints. As such, each of them faces its challenges in its unique way. The greatest challenges for one institution are not necessarily the greatest for another institution.

3.7.2 Project Governance

In general, ERP projects present a governance structure with a multi-layered organization chart. The organizational chart shows the importance of the ERP project for the entire institution. Typically, the University President is at the top of the hierarchy. The project teams are at the bottom. In the middle are the Steering Committee, the project sponsor(s) and the Project Manager.

University President			
Executive Steering Committee			
Project Sponsor(s)			
Project Manager			
Project Team 1	Project Team 2	Project Team 3	Project Team n

Table 3-4 : Typical ERP Project Governance Organizational Chart

The Steering Committee comprises higher ranking officers of the institution such as Vice-Presidents and College Deans. The Project Sponsor is typically a high ranking Executive Officer who strongly supports the project and provides resources for the project team. In most cases, it is the Vice-President of Finances/Administration and/or the Provost. In some institutions, the Chief Information Officer (CIO) is a member of the team of sponsors. This governance model presented above may vary slightly depending on the overall

governance of each institution. In some cases, the President is not mentioned in the organizational chart. In a few cases, the CIO is the Project Manager. Some institutions appoint a Project Director above the Project Manager. In such cases, the Project Manager is the operational manager and the Project Director is the public face of the project or a project champion and/or sponsor.

3.7.3 Selecting the Project Manager

The ERP Project Manager is the highest ranking officer exclusively in charge of the ERP project. This person leads the project planning effort and coordinates the activities of the different project teams and he/she works closely with university executives to keep them informed and engaged. Selection of the Project Manager is critical. What is the ideal profile for the ERP Project Manager? There is no clear answer. Most project managers considered had a long experience working for their university in information technology leadership position or a functional area leadership position like Registrar or Director of Finance/budget.

Among Project Managers considered in this study, sixty percent of them were in an information technology leadership positions. Eleven project managers (out of thirteen) were hired within the institution and most of them did not have an ERP project management experience before. Only Project Manager 12 and Project Manager 13 led another ERP implementation before. These two managers were selected after a competitive search for having successfully led an ERP implementation project at another university. A look at the profile of project managers considered allowed us to establish the following criteria for selecting a project manager: experience in academic business areas leadership; experience in information technology leadership in higher education; long experience in the higher education environment/culture; team building/consensus building experience or experience leading an ERP implementation project in higher education. The Project Manager selected for a project has the responsibility for building teams.

3.7.4 Selecting Project Team Leaders

In all cases, the Project Manager selected project team leaders with the support of the project sponsor and the Chief Information Officer. The knowledge and the judgment of the Project Manager are very critical in this team leaders' selection process. The process starts with the Project Manager identifying potential team leaders in technical and support functions and auxiliary areas. With the support of the project sponsor and the CIO, he/she would then negotiate with the functional units and the supervisor of the individual identified. The negotiation process will continue until these potential team leaders are released from their regular jobs. At this time, they would join the project.

Depending on the size of the institution, teams are organized in the following areas: technology areas, functional areas and project support. Technology teams would include the following: Computer System Team, Network Team; Application Development, Database/Data Warehouse Team, Helpdesk Team, Portal/Web Team. Functional teams would include: Finance Team, HR/Payroll Team, Student Information Team, and Financial Aid Team. Project support teams would include: Communication Team and Training Team. Team leaders were selected based on their excellent knowledge of the technical or functional areas and also based on their excellent team building and leadership skills. In functional areas, subject knowledge is absolutely more important than technology knowledge. That is why all of the team leaders come from the business units. A look at the project team leaders' selection process allows us to establish the following criteria: knowledge in the technology of functional area; experience in the technology or functional area; team participation and team building skills. The team leaders selected helped build technology, functional and support teams for the project.

3.7.5 Building Project Teams

Staff is needed in technology, functional and support teams. Project team leaders build their teams with the support of the Project Manager, the CIO and executive sponsors as needed. The team building process is a collaborative effort between the Project Manager and the team

leader for each team. Typically, the Project Manager has the full cooperation of the information technology department to provide the majority of the IT staff. He/she would also gain the full support of the business side that would allow him/her to identify and provide capable staff. The Project Manager would identify positions and role for each team. Then, he/she would work with each project team to identify people within their units to fill these positions. The typical staffing strategy is as follows: 1) transition internal technical and functional staff to the project; 2) transition internal functional staff to the project; 3) transition internal support staff to the project; 4) hire outside to fill positions unfilled with internal staff; 5) hire consultants for additional help on the project; 6) hire temporary workers to help on the project; 7) hire temporary workers for backfilling in technical and functional units.

All projects found about ninety percent of the staff needed within the institution. They moved people from their regular jobs to the project for a long term temporary basis. After filling different roles and positions from within the institutions, there was a gap. At this point, the Project Manager worked on hiring qualified staff from outside. There was a need to hire technical people for technical positions. Project Manager 12 had to go out and hire qualified database administrators (DBA). He had to work with the technical staff to make sure that they hired from outside the institution for five additional technical positions that did not exist. On the functional side, he worked on hiring three people from outside with functional knowledge in specific areas.

It is important to know the percentage of the project team that was full time on the project. Only Project Managers 4, 5 and 12 declared that they used fully dedicated staff to work exclusively on the project for the entire duration of the project. In these three cases, all projects staff worked full time on the project. Project 4 had 350 staff members on board full time. Project 5 and 12 had 150 people each on board full time. These projects used temporary workers to backfill for these positions. These projects built this staffing strategy into their budget.

With the other projects, less than ten percent of the project staff was dedicated full time. These full time staff members were typically either externally hired for the project or internal information technology staff. Part-time project staff had to keep their regular jobs.

Technical staff members had to spend part of their time keeping legacy systems running. Functional staff members had to keep running operations in their business units. They juggled between their regular jobs and the ERP project. Depending on many factors such as project milestones, modules under development, academic and fiscal calendars, they spent from twenty percent to eighty percent of their time on the project. Obviously these staff could not handle optimally two jobs each at the same time.

The institutions used different tactics to help with this situation. They hired temporary workers to backfill these positions. On Project 11 for example, a manager was going to spend eighty percent of her time on the project. Her assistant was given a modest salary increase to take on more responsibilities. They hired a temporary person to come in and help support that assistant and provide support for the manager's day to day tasks. Institution 11 moved people further up the chain and brought backfills at the bottom of the chain to help.

3.7.6 Skills Gap and Staff Training Project

Since ERP systems were new projects to the institutions, there was no ERP knowledge on site. There was a need to train technical, functional and support staff for the projects. The biggest challenge in terms of skill gap was on the technical side since the technical infrastructure was completely different from the legacy systems. Technical staff had to raise their skills sets to a level where they could provide support to the functional teams in a short period of time. They did much more training which resulted in more trials and errors. Programmers had to learn new programming languages. Most institutions built training into their ERP implementation strategy. They worked with vendors to identify training needs, audiences, and resources available. Project Manager 2 mentioned that they spent an enormous amount of time on training early. As soon as they made an ERP acquisition decision, they started training both technical and functional people.

Each institution had a training team coordinating training for the project team as well as for users across campus. Training for the project team would take place onsite or offsite (ERP vendor, technology training vendors, and consultants). Each project provided different types of training to the following audiences: Project Manager and project team leaders;

information technology staff; functional and support staff. Project managers and project team leaders received training in project management, leadership/management, communication and conflict resolution and in technical aspects of the project. Information technology staff received training on technical aspects of the ERP systems, ERP architecture, modules, interfaces, and application development. Functional and support staff members were trained on introductory aspects of the ERP system and on functionalities of the ERP system in each business area. At some point, all staff members received training on team building and team work, communication, and conflict resolution. Project Manager 10 confirmed that they had to provide this soft skills training to project leadership and staff members. Each institution used different training methods: instructor-led workshops, self-study materials on technical skills and soft skills, and web-based/computer based training.

3.7.7 Managing Project Teams

The management of project teams is typical of general and/or IT project management. Project managers managed the projects through delegation. Project Managers 5 and 13 pointed out that they worked with technical and functional team leaders who managed the daily activities of their staff. The functional leaders were supposed to coordinate all the people working on the functional side. Technical leaders were supposed to coordinate the people working from the technical side. The Project Manager established clear expectations for these leaders about what to do. Leaders had to report problems with staff. When problems arose, they were discussed with their supervisor. Each project team leader used the same delegation strategy within their teams.

Another strategy used by the project managers and project team leaders was management based on deliverables. Project Managers 2 and 7 said that they used to set clear goals and with specific deliverables for team leaders. Each project team leader would also set clear goals and deliverables for each group, sub-group or individual under his/her supervision. Ideally, there were always clear dates for a specific deliverables. This strategy made it easy for supervisors to verify that each team, group, sub-group or individual did their job or not.

Communication was an important aspect of managing the projects. For each project, there were weekly meetings between the Project Manager and project team leaders. The Project Manager communicated frequently with the administration. E-mails, face to face meetings, and the project website helped with communication. Project Manager 2 mentioned that he used regular core team meetings on a weekly basis; teams shared information about their areas. This kind of environment helped develop team spirit and broke down barriers between technical and functional leaders. Communication focused on relationship building and the importance of having face to face meetings. Smaller size projects had more opportunity for frequent face to face meetings with everybody. Even larger size projects that could not bring everybody together on a weekly or monthly basis did so at least a few times a year. Project leaders met on a weekly basis within their team. On all projects, team leaders met on a weekly basis with the Project Manager.

Conflict resolution is an important part of ERP project management since these projects were very stressful and many conflicts arise. Negotiations and discussions helped resolve conflicts. Open and honest communication about problems was critical. For all projects it was necessary to deal with it at the lowest level possible. Each team leader was in charge of resolving issues in his/her area. Issues could escalate to a higher level as appropriate. Individuals had to work on conflicts. If they could not do it, then the issue was moved up to the supervisor level. If that did not work, then the Project Manager was involved. They held discussions to clear issues and get people to work together again. Each project spent a fair amount of time doing this type of conflict resolution since misunderstandings between the technical units and the business units were common. At the beginning of a project, cultural gaps exist as staff members come from different backgrounds, knowledge and temperament. Project Manager 6 mentioned that on some occasions, to resolve a conflict, he would rotate a person to another position. When this strategy did not work, on some rare occasions, a person would be removed from the project and returned to their original position within the institution.

3.7.8 Money, Motivation and Morale Issues .

3.7.8.1 Salaries and other Forms of Financial Rewards

The salary issue represented an important issue in ERP implementation, and all thirteen project managers had to deal with this issue one way or another. Projects 7 and 13 reported salary increases. The justification was that when they added positions with more pay, they had to make adjustments in the salaries of people who had been underpaid. This was considered part of the budget process and built into the budget. They thought that they could not hire a new person without experience and pay him/her higher than the existing staff for similar positions. If they hired new system analysts with higher salaries, they had to adjust the salaries of existing system analysts. This was an issue that had to be addressed in order to maintain morale high. Project Manager 6 reported that on the technical side, salaries increased quite a bit, because ERP software programmers made $ 20,000 more. Salaries went up twenty to twenty five percent on the technical side as well as on the functional side to some extent. Human Resources and Finance departments increased salaries even though they did not go up to corporate salaries in order to be adequate to recruit the type of people needed. Project Manager 8 reported that, for the most part, Institution 8 had poor salary compared to any other institution in their peer group. They had to adjust salaries with a 15% increase to match salaries at peer institutions and this increase was satisfying for staff.

Project manager 6 reported that he brought in ERP software application developers who commanded higher salaries for their experience. Project 7 and 13 reported that they had to hire database administrators that commanded high salaries. In addition to these higher salaries to some new staff members with special technical skills, all projects had to bring highly priced consultants to help at some point. All projects had to adjust existing salaries to match salaries of highly paid new staff members with similar positions. Some adjustments were permanent and in some other cases, such adjustments were temporary for the duration of the project. Project Manager 3 reported that they provided temporary salary adjustment for the core team leaders. This was a small amount of $2000 per person, but the symbolism of this increase was much appreciated.

The most common types of financial rewards were overtime pay, bonuses and awards. On all projects, a large number of staff members had to juggle between their normal jobs and their responsibilities on the ERP project. That was like having two full time jobs, and none of them could do two full time jobs. They had to put in overtime hours. Overtime hours became particularly important when a milestone was getting close for a specific module. All projects had built in budgets for overtime hours. Project Manager 2 reported that the biggest issue was overtime, and they agreed that they would pay overtime hours authorized by team leaders. Thus, salaries were not increased for working on the project, but project managers recognized and paid overtime.

Bonuses and awards were other forms of financial rewards that almost all projects used. The project would pay a bonus to employees of a team, a group or to an individual staff at some important milestone or for a job well done. Project Manager 11 reported that there was a potential for a team getting a bonus -- at the end -- ranging from 500 dollars to 3,000 dollars depending on the individual's role. This bonus was only given once the project went live. Project Manager 10 reported that they did not increase salaries but they used extraordinary performance award and small spot bonuses. A team or group leader would nominate a person for an award for a specific job done. A committee would evaluate the performance and the recommendation and grant the award. Someone would receive a small spot bonus (about 100 dollars) for work done over a week-end.

3.7.8.2 Employee Morale and Motivation

All project managers recognized that ERP implementation was a very long, tedious, stressful and frustrating experience for staff. As such, they had to do something to maintain employee morale and motivation. Maintaining employee morale and motivation was a matter of communicating with them, showing understanding and support, celebrating milestones, allowing staff to relax and openly expressing recognition. Project Manager 11 reported that they organized cocktail hours, identified people at risk and worked with those people individually. To solve morale issues, project leadership talked and listened to employees, acknowledging their frustration. It was very helpful that leaders empathized with staff and

recognized their contribution to the university. Employees realized the value of new skill sets learned and that they could apply these skills anywhere.

Project Manager 13 reported that communication was an important tool to keep morale and motivation. It was important to talk, explain and provide information to keep staff engaged. It was important to evaluate and recognize each person's contribution to the project. Project Manager 6 reported that they celebrated successes, birthdays, and milestones and they tried to give people adequate balance and flexibility in terms of hours spent on the project. Project Manager 10 reported that they encouraged people to take breaks and vacations. Everybody had a week or two of vacation every six months in order to stay fresh and productive. They had periodic celebrations whenever they made a milestone. Project sponsors provided free lunches or free dinners once a year. At institution 1, motivation tactics included promise of transition period to some temporary staff members before severance.

3.7.8.3 Employee Turnover

All project managers reported that, statistically, employee turnover was so insignificant that it was not an issue. Each project lost a very limited number of staff every year. Most projects were prepared to handle these situations. Some employees were lost to retirement. Others moved on for family reasons or other life circumstances. No project reported that employees left because of the project. However, Project Manager 11 reported a problem developed when two programmers left taking with them important skill sets and knowledge. It took a semester to hire replacements. They had to hire consultants. Project Manager 6 reported that they had limited number of employee turnover, but they had a critical loss. They lost a project leader when implementing the Finance module. A replacement was difficult to find. Project Manager 10 reported that out of 120 people, the project lost about ten people during a three year period. Three of them were critical. One was the data management team leader who headed their institutional assessment data. It took six months to fill that management team leader position. During this time the Project Manager was in an acting role, which was not optimal. Project 3 had a turnover in the DBA ranks. They brought in a consultant for three months to keep things going while transitioning to find a new DBA.

3.7.9 Summary of Challenges and Tactics

The ERP projects experienced different challenges in the area of human resources and staffing. The list of challenges and issues can be summarized as follow:

- Defining roles and positions to be filled
- Money for hiring needed staff
- Money for encouragement, appreciation, expression of satisfaction
- Finding people with knowledge of business processes in functional areas
- Getting staff released by the business teams
- Finding people with technical skills
- Getting dedication and commitment to the project
- Staff juggling between ERP project and regular job
- Funding for backfills
- Finding proper training for project staff
- Teaching team/people skills
- Dealing with stress and frustration
- Staff turnover
- Getting existing staff to reach full performance
- Paying higher salaries
- Paying bonuses and awards

For each challenge or issue that ERP project managers faced, they developed different tactics to solve the problem. In order to define roles and positions, they worked with vendors, consultants and functional areas of the institution. For financial issues related to hiring new staff needed for the project, they built staffing budget within the overall budget of the ERP project. In order to provide monetary award to appreciate and encourage staff on the project, they had budget initially planned for this purpose or they negotiated with their project sponsors. To find people with skills in functional areas, they selected a team leader from the functional area, then this team leader helped select other team members. To get staff released by their business units so that they could work on the ERP project, project managers

negotiated with supervisors in functional areas with the support of project sponsors as needed. They were involved in the process of providing backfills for these functional areas.

To avoid staff juggling between their responsibilities on the ERP project and their regular jobs, most project managers built backfill funds into the project plan. A few projects hired fully dedicated staff for the projects. To bridge skill gaps for staff in technical areas as well as in functional area, all projects put in place a training strategy. This allowed them to build training expertise inside and to utilize training resources out of the institution. They provided training on technical skills and on soft skills to a large number of audiences. They provided training on team building/team skills. This helped existing staff get up to speed to efficiently work on projects.

All projects encouraged many activities to help alleviate stress and frustration. Stressed out staff were encouraged to take time off. Leaders also spent time talking with staff expressing appreciation and understanding and to help emotionally. Staff turnover was minimal. But when it happened, leadership resorted to hiring new staff or using consulting services on a temporary basis. Finding a replacement was a challenge in each case. Most projects built into their budgets additional funds to pay for higher salaries for technical/critical staff and to pay bonuses and awards to staff for excellent contributions.

3.8 Discussion

3.8.1 Revisiting our Research Questions

The purpose of our study was to bring answers to questions such as: How do you find the people and how do you deal with skills gaps? How do you financially attract and maintain the right people? How do you resolve conflicts in the project team and maintain morale and motivation over many years? To provide answers to these questions, we pursued three objectives: (1) point out the current state of discussions of staffing tactics and challenges in the literature; (2) identify staffing tactics and challenges perceived by managers working in the higher education sector during the implementation of their ERP projects; (3) establish a table of staffing scenarios and a matrix of staffing tactics for ERP implementation in higher

education that could help ensure greater success in ERP systems' implementation in general. Sections 3.7.1 through 3.7.9 of this paper provide ample answers to these questions. For the first question, the answer is that: 1) projects managers found most of their staff within the institution moving people (full time or part time) from their original positions to the ERP project and 2) all project managers hired some staff outside and used consultants. The vast majority of staff hired within the institution maintained their original jobs and juggled between those jobs and their responsibilities on the ERP project. All projects used a backfill tactic to help keep business units running while some of their staff members were working on the project. For the second question, the answer is that: 1) project managers hired needed staff from outside proposing higher salaries and 2) they maintained these staff members using different techniques including offer of different types of financial compensation, vacation time and verbal recognition. For the third question, the answer is that project managers resolved conflicts and maintained motivation and morale using various techniques including open discussions, negotiations, arbitration, financial rewards, milestones' celebration and verbal support and recognition.

3.8.2 Further Discussion of Some Specific Issues

A major question dealing with staffing for the ERP project was the use of dedicated or non-dedicated staff. This topic was not really discussed in the literature that we reviewed. A staff entirely dedicated to the project would allow this project to move faster. Staff members would develop expertise faster and would certainly provide better service to the project. The ideal situation for a project is to have a staff fully dedicated. Most projects could not afford a fully dedicated staff. There was a cost issue. There was also a job issue for such a dedicated staff at the end of the project. One could not keep on board a dedicated staff at the end of the project. However, a non-dedicated could not develop the expertise and focus needed for the ERP project. All ERP projects had to work with existing staff within information technology units as well as within functional areas. The projects needed the knowledge and the expertise of these staff members in functional areas. For instance, how could one develop the Human Resources or Finance module (of the ERP system) without staff from these departments? The

key element was to make sure that staff members juggling between their original jobs and the ERP project could provide time required.

Skills gaps and training represented a major issue with ERP projects. Most staff hired within the institution do not have the skills needed for the job. They were hired for their knowledge of activities in their functional or technical units. All projects had to develop an extensive training plan to provide the skill sets needed by different staff members on the project. To run the project on a daily basis, most project managers delegated management responsibilities to project team leaders. These team leaders had responsibility for conflict resolution within their teams. In terms of compensation, some projects had to hire a few high cost staff in some key technical positions, such as a Database Administrator (DBA) position. Most projects lost a few staff members to retirement. Whenever there was an employee turnover, projects hired a new staff for the position or used consultant services.

3.8.3 Project Staffing Sources, Tactics and Implementation Phases

All projects use in different proportions internal and external staffing. All projects use different staffing tactics at different stages of the project. The table below (based on data collected from the thirteen projects that we considered) presents these tactics at different phases of the project.

Project Implementation Phases		
	Pre-Implementation	Implementation	Post-Implementation
Staffing Tactics	• Planning for human resources • Defining roles and positions to be filled • Identifying potential project staff with the	• Putting project team in place • Distributing roles and responsibility • Supervision and monitoring of project teams and staff • Organizing and leading project team meetings	• Disbanding project teams • Ending vendor staff and consultants contracts • Returning some staff to their original positions • Assigning some staff

	institution with proper skills • Getting staff released for the project • Planning money for staff and backfills • Early training project teams	• Handling project team communication • Training and retraining project teams as needed • Encouraging, coaching team members • Celebrating milestones • Paying bonus and awards • Adding new staff/replacing staff as needed • Helping staff members handle stress • Resolving conflicts within project teams	to other jobs within the institution • Keeping promise of transition period to some staff members before severance • Laying off temporary project staff not retained • Maintaining core staff for operation and maintenance of the ERP systems

Table 3-5 : Staffing Tactics at Different Phases of Project Implementation

During the pre-implementation phase, the purpose is to plan and budget for human resources for the project. The implementation phase is concerned with administration of human resources on a daily basis. It puts a project team together, engages that team and maintains their engagement. It assigns duties and responsibilities, monitors and controls, resolves conflict within teams, encourages and rewards staff. The post-implementation phase phases out the project team. The focus is on putting in place an ERP operation and maintenance team.

3.8.4 Toward an ERP Project Staffing Matrix

Our objective in this section is to present staffing scenarios, constraints and implications of these scenarios.

3.8.4.1 ERP Projects Staffing Scenarios

ERP projects can build their teams with internal or external staff. These teams can be used full time or part time on the project. The following constraints will play a significant role in the choice of any of these scenarios: (a) budgetary/financial constraints; (b) availability of needed human resources internally and externally; (c) time/schedule constraints; (d) other constraints. The first three constraints represent the most visible constraints. If it is cheaper to use internal staff and the budget is limited the tendency will be to rely more on internal staff. If external technical staff will make the project move faster and money is available, the project could rely on external expertise. Most projects use a combination of internal and external staff working full time and/or part time on the project. The combination of staffing sources (internal and external) and staff time (full time and part time) on the project provides the following table of staffing scenarios.

		Staff Time Commitment to Project		
		Full time	Part time	Hybrid Time
Staffing Source	Internal	Internal/Full time (1)	Internal/Part time (3)	Internal/Hybrid Time (7)
	External	External/Full time (2)	External/Part time (4)	External/Hybrid Time (8)
	Hybrid Source	Hybrid Source/Full time (5)	Hybrid Source/Part time (6)	Hybrid Source/Hybrid Time (9)

Table 3-6 : Staffing Scenarios Based on Staffing Source and Staff Time Commitment

Table 5 and table 6 derive from Table 2. Table 6 shows that in theory, there are nine different scenarios. The scenario "Internal/Full time" refers to a project that uses a hundred percent internal staff that works full time on the project. The "External/Full time" refers to a project using a hundred percent of external staff working full time on the project. Our field experience allows us to point out that these theoretical scenarios do not exist in practice. The

90

scenario "Internal/Part time" refers to a project using a hundred percent of internal staff working part time on the project. The scenario "External/Part time" refers to a project using a hundred percent of external staff working part time on the project.

All projects use some hybrid staffing source with some hybrid time commitment. The scenario "Internal/Hybrid time" refers to a project using a hundred percent of internal staff, some working full time and some part time. The scenario "External/Hybrid time" refers to a project using a hundred percent of external staff working full time and part time. The scenario "Hybrid Source/Full time" refers to a project using a combination of internal and external staff working full time on the project. The scenario "Hybrid Source/Part time" refers to a project using a combination of internal and external staff working part time on the project. Most projects use the "Hybrid Source/Hybrid Time" scenario, a combination of internal of internal and external staff working full time and part time. Some staff members work full time while others work part time. In some cases the same person works full time and part time on different stages of the project.

Most projects cannot do without internal staff with expertise in functional areas and external staff with ERP or IT technical expertise. Indeed, most projects use a hybrid scenario with varying degrees of combination. Most projects will use fifty percent to ninety percent of internal staff members. The unique constraints of each project will determine the degree of combination that each institution needs. In short, the different combinations of hybrid scenarios are closer to the real world than non-hybrid scenarios. One should note part time consultants are considered part of external staffing.

Each scenario has specific consequences on the project in the following areas: training of project staff, training of end users of the ERP system, project schedule, project team building, project team work, required technical/technological expertise, required functional expertise, time needed for project teams to be up to speed, human resources management, project team morale, human resources/staffing cost and overall cost of the project (including salaries, bonuses and other monetary compensation). Typically, technical staff members hired externally tended to be more expensive than those selected internally. Consider these few cases: Higher salaries to external staff tend to cause salary adjustment for internal staff with

similar position. Technical staff selected without ERP project experience will require more technical training and will take more time to be proficient. Functional team members selected internally will know their business areas and will not require a lot of training in those areas as opposed to external staff who will spend time learning these areas.

3.8.4.2 ERP Projects Staffing Matrix

Based on our experience in the context of thirteen projects, one could attempt to establish an ERP project staffing matrix for higher education taking into account staffing scenarios and impact of these scenarios on important aspects of the project. We propose the following matrix:

Staffing Scenarios	Impact of Scenarios on Project						
	Functional Unit Service Disruption	Functional Expertise on the Project	Technical Expertise on the Project	ERP Functional Training	ERP Technical Training	Project Schedule	Project Cost
Internal/Full time (1)	High	High	Low	Low	High	Medium	Low
External/Full time (2)	Low	Low	High	High	Low	Short	High
Internal/Part time (3)	Medium	High	Low	Low	High	Long	Medium
External/Part time (4)	Low	Low	High	High	Low	Long	High
Hybrid Source/Full time (5)	Medium	High	High	Low	Low	Short	Medium
Hybrid Source/Part time (6)	Medium	High	High	Low	Low	Long	Medium
Internal/Hybrid Time (7)	Medium	High	Low	Low	High	Medium	Medium
External /Hybrid Time (8)	Low	Low	High	High	Low	Medium	High
Hybrid Source/Hybrid Time (9)	Medium	Medium	Medium	Medium	Medium	Medium	Medium

Table 3-7 : Staffing Scenarios and Their Impact on Project

92

It is important to point out that the scenarios and their impacts in the table above are tendencies based on the data that we have. More in-depth investigation will be needed to confirm these tendencies. For scenario (1) there will be high functional unit service disruption due to staff moving from functional units. Since internal staff members having expertise in functional areas, the need for training in this area is low. On the other hand, since internal staff members do not have technical ERP expertise, the need for training in this area is high. The project schedule will be medium, since time gained in functional expertise will be reduced by time lost for lack of technical expertise. The project cost will be low because internal staffing tends to cost less.

3.9 Conclusion

Our study of thirteen projects contributes to the investigation and documentation of ERP projects' staffing issues in higher education from a project management perspective. Our study contributes to qualitative research in the field of staffing issues related to ERP implementation in higher education. We confirmed the relevance of previous studies that mentioned human resources/staffing as a critical success factor. We found that staffing issues vary from one institution to another depending on several factors, including the state of existing human resources and technology, the social and administrative context, and the strengths and weaknesses of the institution. We found that some institutions face staffing issues that are unique. The findings of our fieldwork can help prepare future ERP managers to anticipate tactics for project staffing, and project leadership and project teams' prolbems, particularly in higher education.

Our study tried to find the best approach to staffing issues for ERP projects in higher education. We found that there is no single answer to this question. One should consider several factors including constraints of each project. These constraints will determine the scenario that a specific project can afford. The scenario selected will impact all other aspects of the project. A project with financial limitations will not be able to afford expensive external talents and consultants. The absence of such talents will require extensive

development of internal staff. This development period will have an impact on the project schedule and on the quality of the project. On the other hand, a project with ample resources will be able to hire quickly all needed technical expertise that will help the project move faster. All the information about project scenarios, constraints, choices and implications are relevant for ERP project staffing in other sectors.

Working on thirteen projects at thirteen different institutions was beneficial. However, we had to limit our field work to project managers who accepted our interviews. We limited our study to the standpoint of the ERP project managers. This is our methodological choice. However, this choice gave us only the standpoint of the project manager, excluding other perceptions and perspectives on ERP project management. A study that takes into account information from various staff members on ERP projects will provide diverse perspectives on the issues. Many project managers that we interviewed were not actually in the project management role. They had already completed their projects. This can be considered a limitation. Their assessments of human resources tactics was based on their memory. These assessments could have been different while they were on the project or at the end of the project. However, some of the project managers were in action on the project at the time of our interviews. Their assessments may reflect immediate contingencies. They may have different assessments later, when they have completed their projects.

Future studies research avenues include: systematic comparison of ERP staffing issues, tactics in the corporate world and in higher education; dedicated studies of the impact of project staffing on different aspects of the project including ERP project communication, management of data conversion and legacy systems, ERP Project training issues, ERP project quality assurance, ERP project budgeting and finance, ERP project risk assessment and mitigation, and ERP software package customization. It is equally important to study staffing issues for different types of institutions (for example, a community college versus a big research university), for ERP projects in private versus public universities and for ERP projects in American universities versus projects in academic institutions in Canada, Western Europe or in other places.

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3.11 Appendix 1: Interviews Excerpts

Project Manager 1 :

"Most of the staff members were hired from within the University, from Information Technology units and from functional areas. The Project Manager was the Registrar of the university. She took a three year of leave of absence from her original position to work on the project. A few staff members were hired from outside. The project relied also on a large number of consultants from the vendor and from other sources."

"The project had a training coordinator in change of identifying training needs and finding ways to address them. We conducted a lot of training session, for different groups with the help of the vendors. We trained technical staff as well as staff in functional areas. We trained them not only on the technical side of the ERP, but also on soft skills like team building and team work."

Project Manager 2:

"We had dedicated staff and non-dedicated staff. Developers were eighty percent committed and functional staff members were seventy percent committed. Developers were still keeping legacy systems running and the functional staff members were still doing their regular jobs every day. We burned a lot of people out. We hired very minimum backup. We hired eight backup people to supplement the functional office leadership."

Project Manager 4

"There were a lot of conflicts. Our strategy was to deal with it at the lowest level possible. We had individuals work on their conflicts between themselves. If they could not do that we would elevate the level of resolution to the supervisor level. If that did not work, one of the Associate Project Managers or the Project Manager would be involved. We held discussions to clear the issue and get people to work together again. We spent a fair amount of time doing this type of things because there was misunderstanding between the technical units and the

business units. They did not understand that cultural gap in the beginning. They had different culture, knowledge, temperament."

"Universities tend to be more stable than other businesses. We did not have a lot of turnover. We did not lose any of our technical leads or functional leads. We did have turnover in the DBA ranks. We brought in a consultant for three months to keep things going while transitioning to find a new DBA. We had little turnover. We worked hard to keep morale high. We carefully chose people who would stay."

Project Manager 5
"There are few challenges: Finding the right people to work with [the ERP application]; getting your existing staff up to speed; paying higher salaries. Finding the right people to work with [the ERP application], and getting your existing staff up to speed. That involved a lot of training. Depending on your market, finding the skills, the expertise can be difficult. Find people with expertise and experience is a problem. Then, you have to pay higher salaries. Depending of the community, things can be difficult. In a small community, it is more difficult. You have to be aggressive in finding people. You have to find people who can learn and adapt. The project was fortunate. Staff turnover was very minimal. It was not an issue for us."

Project Manager 8
"Employee turnover was insignificant. Nobody left. Most people want to live in the South West so nobody left the project. More people left in my networking department than on the project. This was not an issue."

Project Manager 11:
"These go back to backfills, backfill dollars. We budgeted a significant amount of dollars for backfills, it was not enough. (…) We hired a lot of temporary employees. We hired positions to support staff members that were going to work on the project for more than fifty or sixty

percent of their time. We had parties with cocktails hours once a month, to let people blow of. But, the real approach that helped us with human resources and staffing issues was proving factual dollars. We also had a lot of consulting hours."

Project Manager 12:

"You have to be positive and show that you are working as hard. You have to celebrate milestones. We have parties, and pizzas. We have recognition activities. We invite people for coffee. You have to acknowledge that things are difficult and show understanding."

Project Manager 13:

"One of the very first things that I did was: before the budget, I had a project staffing plan. Because the staffing plan drags the major part of the project. You can't build the budget without the staffing plan. (...) I would walk around the campus to identify potential project teams and leads and you find out potential candidates and gaps. The challenge here is that you have not done this before; you do not know what to look for. It important to get guidance from people who have done ERP system before and you can get information on the internet about how other institutions built their teams."

3.12 Appendix 2: Questionnaire

This appendix presents the list of question used for the semi-structured interviews with ERP project managers.

Questions:

Could you please give me an overview and a background on your ERP Project?

Please, provide background on project management problems.

In your opinion, what are the greatest problems and challenges in the area of staffing and human resources?

How did you plan and acquire human resources? How many people did you have on the project?

Did you have a dedicated staff or a non-dedicated staff? What percentage of their time was devoted to the project?

How did you deal with skills gap among your staff?

How did you manage staff on a daily basis (assignment, reporting, monitoring)?

How did you communicate with project staff?

How did you resolve conflicts among staff?

Will you discuss staff salaries and satisfaction in relation to their salaries?

How did you maintain employee morale and motivation?

How significant was employee turnover and how did you deal with it?

Chapitre 4: Le parrainage des projets ERP en milieu universitaire

4.1 Résumé

Cet article analyse le parrainage des projets ERP en milieu universitaire par un administrateur de l'institution. La littérature indique que les administrateurs qui parrainent les projets jouent un rôle crucial dans le cadre de la mise en œuvre des systèmes ERP en milieu universitaire. Cependant, aucun article n'a été exclusivement consacré à ce sujet. La présente étude portant sur treize projets ERP dans des universités aux États-Unis découvre que, très souvent, 1) les projets dépendent d'un parrainage solide de la part d'un administrateur de l'institution; 2) les projets ne peuvent prospérer sans ce parrainage; 3) les projets ont recours à des administrateurs de haut rang (tels que le Vice-président des affaires académiques ou de Vice-président en charge de l'administration) de l'institution comme parrains; 4) les projets forment une équipe de parrains afin de couvrir différents domaines d'expertise et de responsabilité. La présente étude évalue ces conclusions et propose des critères de sélection des parrains qui pourraient être utiles dans le cadre de la mise en œuvre des systèmes ERP aussi bien en milieu universitaire que dans d'autres milieux.

4.2 Commentaires

Ce chapitre n'a pas encore été soumis à une revue pour publication. L'idée de base de cet article m'est venue en voulant découvrir et documenter le parrainage des projets ERP en milieu universitaire par un administrateur de l'institution. Après avoir consulté les

professeurs Marc Frappier et Jean Éthier pour recueillir leurs avis et suggestions, j'ai mené le travail d'enquête sur le terrain et j'ai rédigé la première ébauche de l'article. L'apport principal de cet article est de découvrir et documenter le parrainage des projets ERP en milieu universitaire par un administrateur de l'institution.

Executive Sponsorship and
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102

4.3 Abstract.

This paper is a study of executive sponsorship for ERP systems' implementation in higher education. Literature indicates that executive sponsors play a critical role in the context of ERP projects' implementation in higher education. However, no article has been exclusively dedicated to this topic. Our study of thirteen universities ERP projects throughout the United States finds that most projects: 1) depend on strong executive sponsorship; 2) will not prosper without executive sponsorship; 3) use high-ranking officers (including VP of Academic Affairs, or VP of Administration) of the institution as executive sponsors; 4) use a panel of executive sponsors to cover different domains of expertise and responsibility. Our study evaluates these findings and proposes an executive sponsor selection criteria table that could be useful to ERP implementation projects not only in the higher education sector but in others as well.

4.4 Introduction

ERP projects are major information system projects that profoundly transform organizations, as they integrate and automate many organizational functions. They were initially developed for the manufacturing sector, with Manufacturing Resource Planning (MRP and MRP II) inventory systems (Rachid et al., 2002; Jacobs and Weston, 2006). In manufacturing, ERP systems integrate and automate disparate functions, such as supply chain, production management, financial, accounting, and human resource management. After success in manufacturing operations, use for ERP systems soon extended to other sectors as well, including non-manufacturing corporations, public administrations, and academic institutions. In these new sectors, ERP systems are essentially used as tools for accounting, finance, human resources, and customer-relations management.

Even after several decades of practice, implementing ERP still remains a challenging endeavor (Esteves-Souza and Pastor-Collado, 2000, 2007; Brown and Vessey, 2003; Umble et al., 2003; Al-Mashari et al., 2003; Soja, 2006). This conclusion applies particularly to the

103

implementation of ERP in higher education (McCredie and Updegrove, 1999; Furumo et al., 2004; Cornford and Pollock, 2004; and Babaa'i, 2009), a sector marked by great complexity of managing some particularities related to governance, decision-making and culture. Just like studies on ERP systems' implementation in general, those on implementation in higher education have shortcomings. No study has focused on project managers' perceptions of ERP implementation sponsorship issues in the higher education sector. This study tries to answer the following questions: who is the executive sponsor? What is his/her role? How is he/she selected? How does he/she participate effectively in the implementation? Information from project managers could certainly provide new insights and may enable more successful implementation of ERP in this sector and in others. This study attempts to fill this gap by pursuing three objectives: (1) identify and categorize executive sponsorship issues identified in the recent literature on project implementation; (2) identify executive sponsorship issues perceived by managers working in the higher education sector during the implementation of their ERP projects; (3) compare the results of (1) and (2) to identify how these executive sponsorship issues identified by managers in higher education could help in the implementation of ERP in general.

4.5 Literature Review

4.5.1 Overview

ERP literature reviews by Esteves-Sousa, and Pastor-Collado (2007), Botta-Genoulaz et al. (2005) and Moon (2007) indicate that there is no article dedicated to the study of executive sponsorship for ERP implementation in higher education. Consequently, there is no dedicated literature on the topic for review. However, trade/practitioners' literature and research literature discuss executive sponsorship. Information technology research literature on critical success factors presents executive sponsorship as a key factor. We consider these types of literature.

4.5.2 Review of Trade and practitioners' Literature

The topic of executive sponsorship is profusely debated in the trade literature by project management practitioners. This literature is presented in the form of short articles in trade magazines, white papers and blogs. All of these trade articles point out the importance of executive sponsorship and the responsibilities of effective sponsors. The four articles discussed below are representative of this trade/practitioners' literature. In an article about the role of the project sponsor, Linda Franks (2011), a Senior Project Manager defined the characteristics of the ideal project sponsor in the following terms: an executive: someone who has the ear of those in the C-suite and authority over many of the departments effected by the project; an influencer: someone who has earned respect in the organization and has the power to influence and enforce project requirements; a spokesperson: someone who understands the organizations culture, goals, and mission and can associate the project results with critical issues. Linda Franks also stated that the project sponsor should have these additional characteristics: a communicator; an obstacle remover; a "know-it-all"; a director; a cheerleader (Franks, 2011).

In an article entitled "Executive Sponsors: What They Really Do", Bart Perkins (2005) –a former CIO and an IT project consultant-- defined executive sponsors' responsibilities in the following terms: sponsor the business case; get approval to proceed; monitor program progress; chair the program Steering Committee; sponsor a risk assessment; be the cheerleader; remove roadblocks; assess program deliverables; capture the benefits. (Perkins, 2005).

In an article entitled "Executive Sponsorship - Critical Success Factor For Strategic Alliances", Norma Watenpaugh (2011) -- a management consultant -- tried to define what executive sponsors do in the following terms: champion and evangelize the value of the alliance; represent the company position on key issues; strategic guidance in aligning with corporate objectives; assist organizational navigation; escalation point for problem resolution; remove organizational barriers/red tape and account for overall alliance performance. Norma Watenpaugh stated that 1) executive sponsorship is about building relationships, 2) executive sponsorship "is most effective when the roles and relationships are proactively managed". As

she said, "like any relationship, it takes effort to build trust between the parties and keep the lines of communication open" (Watenpaugh, 2011).

A trade article, "Executive Sponsorship: Why It Matters and What It Takes", by the FairRidge Group (2009), stated that, "to be effective, the sponsor must be a true key stakeholder, with the power and influence to impact success." This article contended that the executive spsonsor should have the authority to provide resources, to guide the decision-making process at all levels, to empower and reward project staff. This article stated that without these prerequisites, the project could result in failure. The article defined what an effective executive sponsor does in the following terms: creates strategic alignment; builds a coalition of sponsorship; allocates resources; communicates (with employees and project teams) about the business case, the environmental imperatives and the risks related to no change; demonstrates commitment; establishes durability/sustainability for the long term. (FairRidge, 2009).

The trade/practitioners' literature on project executive sponsorship focused on the corporate world, underlined the importance of executive sponsorship and defined the project sponsor's roles.

4.5.3 Review of Research Literature on Executive Sponsorship

Executive sponsorship in the corporate world is discussed in research literature. Bryde (2008) studied perceptions of project sponsorship practices on project success. This study, based on a survey of 238 practitioners in the United Kingdom, found that project sponsorship which is a multidimensional construct is a critical success factor. Esteves et al. (2004) studied leadership roles in ERP projects' implementation in the corporate world. The study based on ERP literature review and a web survey attempted to determine whether the project sponsor or the project manager was the project champion. This study confirmed executive sponsorship as a critical success factor and found that even though both project manager and sponsor are critical for the success of the project, the project champion role is that of the sponsor.

In an article on effective project sponsorship, Helm and Remington (2005) evaluated executive sponsors' role in complex infrastructure projects from the standpoint of senior project managers. This study identified key factors considered essential for the project sponsor role. These factors included: appropriate seniority and power within the organization; political knowledge of the organization and political savvy; ability and willingness to make connections between project and organization; courage and willingness to battle with others in the organization on behalf of the project; ability to motivate the team to deliver the vision and provide "ad hoc" support to the project team; excellent communication skills; compatibility with other key players and ability to provide objectivity and challenge to the project, and; willingness to provide objectivity and challenge to the project.

In an article entitled "The Pivotal Role of the Executive Sponsor", Crawford and Cooke-Davies (2005) identified the following five separate but interrelated roles for the project sponsor: governor of the project; owner of the business case; harvester of benefits; "friend in high places" (connection with all high-ranking officers of the institution); champion of the project. With regard to the "friend in high places" responsibility, the authors stated that the credibility and the status of the sponsor should help him/her work with high-ranking stakeholders for funding the project or for "winning the hearts and minds of influential people who are opposed to or disinterested in the project" (Crawford and Cooke-Davies, 2005). In their view, the executive sponsor is the link between the corporate and project governance and the bridge between "the executive team who set strategy for the corporation and the project team that implements strategy" (Crawford and Cooke-Davies, 2005). In another article, Crawford, L. H. et al. (2008) identified the same sponsor's roles and responisilities above.

Englund and Bucero (2006) underlined the importance of executive sponsorship for project success. This study, a comprehensive work on executive sponsorship in the corporate world, defined the following responsibilities for the sponsor: sell project to stakeholders; coach and mentor project manager; keep project manager/leaders' focus on project tasks/objectives; make business judgment on the project; motivate project manager/teams; negotiate with project team leaders and members to resolve conflict and remove obstacles;

protect project manager and teams; serve as a link between project teams and upper management.

Just like the trade/practitioners literature, all the research studies on project executive sponsorship focused on the corporate world, underlined the importance of executive sponsorship and defined the project sponsor's roles.

4.5.4 Review of Research Literature on CSFs

The literature on ERP critical success factors always mentions executive sponsorship. We consider below nine major studies on CSFs to verify this. Parr et al. (1999) provided a list of critical success factors that placed executive sponsorship -- expressed in terms of "management support"-- at the top. Holland et al. (1999) listed "top management support" among their strategic CSFs.

In a study based on an analysis of seven corporate organizations, Sumner (1999) established a list of critical success factors for each organization. CSFs for most of these corporate organizations included executive sponsorship issues. CSFs for the first company (Monsanto) included "management support." CSFs for the second company (Anheuser Busch Companies) included "obtain and maintain top management support for the project." CSFs for the third company (Sigma Chemical) included: "achieve the support of senior management for accomplishing project goals and objectives and aligning these with strategic business goals." CSFs for the fourth company (Boeing Company) included "obtain strong top management sponsorship". CSFs for the fifth company (Edward Jones Company) included: "obtaining top management sponsorship". CSFs for the sixth company (Ralston Purina Company) did not mention executive sponsorship. CSFs for the seventh company (Emerson Electric Company) included: "Obtain top management support for the project" and "Obtain IT top management support for the project."

Esteves-Sousa and Pastor-Collado (2000) presented a unified CSFs model comprising strategic and tactical factors. Their list included a strategic CSF referring to executive sponsorship, namely, "sustained management support". Esteves and Pastor (2000) believed

that continued management commitment and involvement are critical in order to reach project goals and objectives.

Nah et al. (2001) presented another list of CSFs. The second CSF on the list -- top management support -- is related to executive sponsorship. Nah et al. (2001) contended that top management should publicly approve the project, make it a top priority and support it by providing resources throughout the implementation phase. They underlined the importance of aligning the project with strategic business goals of the institution and tying management bonuses to project success. (Nah et al., 2001)

Somers & Nelson (2004) provided a list of CSFs that included "top management support" and "project champion" which refer to executive sponsorship. These authors stated that management support is critical throughout the project implementation and they stated that this support is the single most important indicator of ERP project success. (Somers & Nelson, 2004).

Brown and Vessey (2003) established an ERP implementation contingency framework including "top management support" as the first CSF. Just like Brown and Vessey (2003), Umble et al. (2003) established another list of CSFs that presented executive sponsorship, commitment by top management, as a key factor. Umble et al. (2003) contended that "successful implementations require strong leadership, commitment, and participation by top management". They contended that "executive level input is critical" and the "project should have an executive management planning committee" for securing resources and championing the project (Umble et al., 2003).

Gargeya and Brady (2005), who clearly underlined the importance of executive sponsorship for ERP projects, contended that senior managers' support is important for funding and for winning employee buy-in, support, and acceptance of the system. In their view, top management support is key.

All of these studies on ERP implementation CSFs discussed above underlined the importance of executive sponsorship and top management support. The table below presents a summary of executive sponsorship related CSFs.

Executive Sponsorship related CSFs	Author(s)
Obtain and maintain management support	Parr et al. (1999); Sumner (1999)
Obtain and maintain top management support	Holland et al. (1999); Sumner (1999); Nah et al. (2001); Somers & Nelson (2004); Brown and Vessey (2003); Gargeya and Brady (2005)
Obtain and maintain project champion	Somers & Nelson (2004)
Achieve the support of senior management for accomplishing project goals and objectives and aligning these with strategic business goals	Sumner (1999)
Commitment by top management	Umble et al. (2003)

Table 4-1 : Summary of Executive Sponsorship related CSFs

4.5.5 Summary

There is no dedicated study on ERP project executive sponsorship in higher education. However, executive sponsorship in the corporate world is debated in trade/practitioners' literature, in research literature and in studies on ERP implementation CSFs. All this literature underlined the importance and the role of executive sponsorship. The table below summarizes sponsors' characteristics/attributes, roles and responsibilities based on trade and research literature reviewed above.

Sponsor's Characteristics/Attributes and Role/Responsibilities identified in Trade and Research Literature		
	Trade/Practice Authors	Research Authors
Characteristics/Attributes		
• A leader with power/authority	FairRidge Group (2009); Perkins (2005); Franks (2011)	Helm and Remington (2005); Crawford and Cooke-Davies (2005)

• Stakeholder/beneficiary	FairRidge Group (2009)	Crawford and Cooke-Davies (2005)
• Compatible personality (with other stakeholders)		Helm and Remington (2005)
• Communicator/cheerleader	FairRidge Group (2009), Perkins (2005) ; Franks (2011)	Helm and Remington (2005)
• Knowledge of organizational politics/culture	Franks (2011)	Helm and Remington (2005)
• Commitment to project	FairRidge Group (2009),	
Role/Responsibilities		
• Sell/champion the project/mobilize the organization for the project	FairRidge Group (2009) ; Perkins (2005) ; Watenpaugh (2011)	Esteves et al. (2004); Crawford and Cooke-Davies (2005); Englund and Bucero (2006)
• Align project with organizational objectives	FairRidge Group (2009) ; Watenpaugh (2011) ; Franks (2011)	
• Seek/secure resources for project	FairRidge Group (2009)	
• Coach/protect project manager/team		Helm and Remington (2005); Englund and Bucero (2006)
• Serve as link between project and top management	Watenpaugh (2011)	Helm and Remington (2005); Crawford and Cooke-Davies (2005); Englund and Bucero (2006)
• Remove obstacles/resolve problems	FairRidge Group (2009), Perkins (2005); Watenpaugh (2011); Franks	Englund and Bucero (2006)

	(2011)	
• Assess project risks and progress/performance	Perkins (2005) ; Watenpaugh (2011)	Helm and Remington (2005); Englund and Bucero (2006)
• Chair the Steering Committee	Perkins (2005)	
• Represent company position on key issues	Watenpaugh, 2011	

Table 4-2 : Sponsors' Attributes, Role and Responsibilities in Trade and Research Literature

The literature reviewed covers different aspects of executive sponsorship for projects in the corporate world. However, studies of executive sponsorship in the corporate world did not focus on ERP systems' implementation and did not address executive sponsorship issues for ERP projects in higher education. Studies on ERP project CSFs that mentioned executive sponsorship did not focus on higher education. They mentioned this topic in lists of CSFs and discussed it in one or two paragraphs. They did not provide elaborate discussions about actual executive sponsorship scope and issues. The strengths and weaknesses of the literature indicate the need and the opportunity for more research on executive sponsorship for ERP projects in higher education.

4.6 Methodology & Research Design

4.6.1 Theoretical and Conceptual Framework

ERP systems' implementation can be studied within the framework of project management. We consider the Project Management Body of knowledge (PMBOK) developed by the Project Management Institute as the reference in this field. We articulated our thought and our research questions for this study using the PMBOK as reference framework. We use this framework because ERP systems implementation is a project management enterprise and the literature on executive sponsorship resides within the realm of project management.

4.6.2 Projects/Institutions Considered

4.6.2.1 The Selection Process

We used the Internet to search for academic institutions that have implemented or were implementing ERP systems. We used the website of major higher education ERP software vendors and ERP software users groups to find information about academic institutions using ERP systems. These different searches allowed us to establish a list of institutions. Then, we used the web to search for the project managers of these institutions. We prepared and sent e-mails to fifty project managers to ask for interviews with them. Of these, twenty-six responded and thirteen accepted our interviews. We ultimately focused our study on these thirteen projects. All selected projects claimed to have been successful because their systems were up and running. In this paper, we refer to these projects as Projects 1 through 13. Similarly, we refer to a project's institution as Institution x, and to its project manager as Project Manager X. The following table provides a brief summary of the characteristics of the institutions selected.

Institution	Size (Number of students, estimates)	Number of distinct campuses	Governance structure / Project structure	Project timeframe
Institution 1	~ 40,000	3 (plus an autonomous medical school)	Decentralized/Centralized	1996-2001
Institution 2	~ 42,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 3	~ 40,000	14 (plus several extension centers)	Decentralized/Decentralized	1997-2002
Institution 4	~ 70,000	4 (plus several extension centers	Decentralized/Centralized	2000-2005
Institution 5	~ 21,000	1 (plus several extension centers)	Centralized/Centralized	2001-2003
Institution 6	~ 12,000	12 (plus several extension	Decentralized/Decentralized	2001-2005

		centers)		
Institution 7	~ 14,000	1 (plus several extension centers)	Centralized/Centralized Project	2003-2006
Institution 8	~ 18,000	1 (plus four satellite campuses)	Decentralized/Centralized Project	2003-2007
Institution 9	~ 10,000 (65% part time)	1 (with 2 urban campuses)	Centralized/Centralized Project	2004-2008
Institution 10	~ 32,000	1 (with 2 urban campuses)	Centralized/Centralized Project	2004-2007
Institution 11	~ 8,000	1	Centralized/ N/A	2005-2008
Institution 12	~ 60,000	1 (with 4 urban campuses)	Centralized/Centralized Project	2006-2007
Institution 13	~ 13,000	1 (plus 4 outreach programs)	Centralized/Centralized Project	2006-2009

Table 4-3 : Basic Information about Institutions Analyzed

Institution (1) is a large university with two separate and autonomous campuses, a medical campus, and a decentralized governance structure. The ERP project was a centralized implementation for the entire institution. Institution (2) is a large university with seven separate major campuses and several minor campuses and extension centers. The institution has a decentralized governance structure. Each campus had its own project even though they all used the same ERP software and exchanged expertise/ideas during implementation.

Institution (3) is a large university with six separate major campuses and several extension centers. The institution has a decentralized governance structure and the ERP project was a local implementation for each campus. Institution (4) is a large university with three separate campuses, a separate medical school and several extension centers throughout the state. The institution has a decentralized governance structure, but the ERP project was a very centralized one with one implementation for the entire institution. Institution (5) is a large university with a major campus and several minor satellite campuses and extension centers across the state. It has a centralized governance structure. The ERP project was one implementation for the entire organization.

114

Institution (6) is a large within a larger system that compromises twelve autonomous institutions. Each institution had its own autonomous ERP project even though they all chose the same ERP software vendor and there was a kind of central coordination for the projects. Institution (7) is a mid-size university with a major campus and two minor satellite campuses. There was one ERP project implementation for the entire institution. Institution (8) is a university with a large main campus and four minor satellite campuses in different locations. The institution had one centralized ERP implementation.

Institution (9) is a mid-size community college with two campuses (with an integrated governance structure). This institution performed a centralized ERP implementation. Institution (10) is a large university with two main campuses with an integrated governance structure in an urban area. The institution performed a single ERP implementation for the entire university. Institution (11) is a mid-size university with a single campus and a single ERP implementation project. Institution (12) is a large university with four campuses (with an integrated governance structure) in a metropolitan area. The institution had a centralized ERP implementation project. Institution (13) is a mid-size university with a large main campus and four outreach programs in four other cities. The university had a centralized ERP project.

4.6.2.2 Categorizing Institutions: Integration, Structure, and Maturity

The purpose of this section is to see if there is a classification system for higher education institutions that will allow us to understand ERP systems implementation. We are using criteria such as (1) degree of integration of the institution, (2) governance structure and (3) information technology deployment maturity levels to classify institutions.

- **Degree of Integration**

Degree of integration refers to the structural organization of the institution. Some institutions have one campus compared to others with many campuses. Some institutions have colleges, divisions that are closely tied together while other institutions have divisions

that are more or less autonomous in terms of administration and operations. This degree of integration has an impact of ERP systems implementation.

An institution with three different campuses that function as three different universities of different sizes and missions has the choice of one implementation for all three campuses or three different implementations. Either choice has an impact of the implementation and project resources (human resources, funds, etc). An institution with a typical university campus on one side and a hospital/medical school on another side has the choice of one implementation or two different implementations. It will certainly be difficult to integrate the functions and operations of these two distinct entities and it will also be difficult to organize frequent meetings of project teams if campuses are in different locations.

- **Governance Structure**

ERP systems implementation is about making the decision to implement an ERP system, selecting a specific software/vendor, and making all other decisions required to complete the project. The governance structure has an impact on the ERP project. Universities are ruled through different governance models: shared governance, corporate governance, and trustee governance. All universities practice all three forms of governance to some extent. However, the most common governance model among American universities is of shared governance. Decision-making is the prerogative of a large number of stakeholders including not only university administrators, but also faculty, students and professional staff. The decision making process in such an environment can be very slow and this can impact the ERP project in a context of fast moving technologies. Universities are organized into administrative wings and academic wings. The academic wings that include colleges and teaching division are typically under the leadership of a Vice-President for Academic Affairs (also called Provost). The administrative wing is led by a Vice-President of Administration/Finance. The Chief Information Officer can be on either side depending on the institution. This administrative organization has an impact on project governance, choice of sponsor(s), implementation and success.

- **Technology Deployment Maturity**

Another criterion that could have allowed us to categorize different institutions of higher education is their maturity levels in terms of technology deployment. The concept of maturity level has been developed by the Software Engineering Institute at Carnegie- Mellon University. The CMMI can be used in the following three different areas of interest: 1) product and service development (CMMI for Development); 2) service establishment, management, and delivery (CMMI for Services); 3) product and service acquisition (CMMI for Acquisition). The different areas of the CMMI will apply to academic institutions as organizations that provide services, development information technology services for internal use and as institutions that acquire information technology services from outside vendors. The CMMI for Development applies to ERP projects in higher education. However, there is no documented case of academic institutions applying the CMMI (or portion of it) to improve their processes in the area of information technology or to acquire a major software application such as the ERP system. An application of the CMMI would have been beneficial for higher education institutions since ERP implementation is incremental and continuous with frequent developments and/or upgrades of modules. If academic institutions applied the CMMI in their deployment of the ERP system, it would have been easy to compare in a systematic way these institutions' abilities to implement ERP system and the impact of their maturity level on the ERP project.

4.6.3 Data Collection Method

4.6.3.1 Overview

Like most studies of ERP systems, we used qualitative research methods. The choice of qualitative methods can be explained by the importance of the human factor in ERP implementation. The qualitative research methodology is very useful and widely used in ERP research. It is particularly suitable to collect data in an environment where human factors, attitudes and behaviors are critical elements. We used a two parts method to collect data. First, we performed a search for institutions, projects, and project managers that performed

ERP systems implementations. We collected relevant information on each institution, its ERP project, and the project manager. This information allowed us to prepare for interviews with the ERP project managers of these institutions. Information collected comprised of the following artifacts: general information about the institutions, project charter, project definition document, project plan, project organizational chart, and other project-related documents.

4.6.3.2 Documentary Sources and Interviews

We initially collected a large number of written and/or electronic resources for documentation about the ERP projects in higher education. We collected data through interviews with project managers. We chose to conduct semi-structured interviews because this method allowed us to collect more information. We interviewed the ERP project managers from selected academic institutions. The purpose of the interviews was to collect firsthand information about each project. To conduct the interviews for Institutions 1, 2, and 4, we made appointments and visited campuses to meet with the respective project managers. For institutions 5, 8, and 12, we met with the respective project managers on third party sites. We followed up with phone interviews to complete the data collection process. For the remaining institutions involved, it was not practical (distance and/or time) to meet with the project managers for interviews. We initiated and completed the data collection process through phone conversations. We conducted the interviews using a standard list of questions. For each project, we created and maintained a data-collection file of information collected through research, face to face discussions, and phone interviews.

4.7 Analysis and Results

4.7.1 Overview of Data Analysis

All projects selected took place between the 1996 – 2009 timeframe. Most academic institutions started their projects in order to replace heterogeneous, aging and failing legacy systems. They wanted to avoid duplication of resources, data and effort. They wanted to

document, streamline and standardize business processes and data collection/management in order to be more efficient in their operations. Some of the institutions prepared years. They documented their needs and businesses. Others did not. In most cases, the institutions could not anticipate the full scope and complexity of the project. In all cases, they had to deal with change management issues. They had to work with people to explain change, to prepare them and to help them go through all the changes. In all cases, they had to work on selling the project to their academic communities and to their project teams. They had to work on setting realistic expectations. In the same way, they had to struggle to maintain the project within scope in the face of multiple requests for customization or additional features. But each institution is a unique case in terms of: experience with large technology deployment, 2) use of technology, 3) financial and human resources, 4) local constraints. As such, each of them faces its challenges in its unique way. The greatest challenges for one institution are not necessarily the greatest for another institution.

4.7.2 Concept and Role of the Executive Sponsor

The Project Management Body of Knowledge (PMBOK, 2008) defines the executive sponsor role in the following terms:

> A sponsor is the person or group that provides the financial resources, in cash or in kind, for the project. When a project is first conceived, the sponsor champions the project. This includes serving as spokesperson to higher levels of management to gather support throughout the organization and promote the benefits that the project will bring. The sponsor leads the project through the engagement or selection process until formally authorized, and plays a significant role in the development of the initial scope and charter. (PMBOK, 2008, p. 25)

The PMBOK does not elaborate on this definition of the project sponsor. However, this brief definition is in line with the "definitions" of the sponsor's roles provided by the studies reviewed. There is no doubt that the sponsor is an executive within the organizational

119

structure of the institution. To present the executive sponsor and it roles for ERP projects in academia, it is necessary to present a simplified view of academic organizational charts and ERP project governance structures. Even though each university has its organizational structure, the typical academic institution has the following organization:

University President				
VP, Academic Affairs	VP, Administration/Finance	VP, Students Affairs	VP, Institutional Advancement	Other VP positions

Table 4-4 : Simplified university organizational chart

The division under the Provost, the "academic wing", comprises academic units such as colleges and departments. The division under the VP of Administration andFinance, the "administrative wing", comprises units such as Finance, Human Resources and Facilities. In specific contexts, different institutions present different variations of this simplified chart. Multi-campus institutions will have a single President and Chancellors under that single President for each campus. In such cases, the divisions under the Chancellor will be Vice-Chancellor divisions instead of Vice-President divisions. Typically, the ERP project sponsor will be one or a few of the Vice-Presidents or Vice-Chancellors. For small institutions, the President may be the ERP project sponsor. The typical ERP project governance structure in higher education is as follows:

Executive/Steering Committee			
Project Sponsor(s)			
Project Manager			
Project Team 1	Project Team 2	Project Team 3	Project Team n

Table 4-5 : Simplified Project Organization Chart

120

The executive/steering committee that comprises top executives and representatives of different constituencies within the institution is the highest authority overseeing the project. This committee provides high level guidance for the project and is instrumental in defining the project charter and overseeing the progress of the project. The Project Sponsor differs from the Project Manager in that the latter is in charge of the day-to-day operations of the project and reports to the former.

All thirteen projects that we considered pointed out the importance of support at the highest level within the institution for the project to succeed. According to the project managers, the project needs support from the university administration. In their views, an executive sponsor is a high-ranking administrative officer within the institution who 1) is a stakeholder in the project; 2) takes ownership of the project; 3) champions the project; 4) secures funds for the project; 5) approves project deliverables and documents; 6) provides the project manager with needed resources to succeed; and 7) makes decisions with institution-wide impact and removes roadblocks to allow the project to move ahead. The executive sponsor makes and champions the case for the project; he/she will help put in place a Steering Committee (that he/she will chair) to help advance the project; he/she will monitor and assess the progress of the project and help resolves conflicts, roadblocks; he/she will strongly support the project manager and provide him/her with needed resources for the project. ERP projects in academia rely on executive sponsors to: help them sell the project to the university community; find funds at the beginning and along the way as needed; discuss with constituencies within the institution; represent the project at the deans' council or at the vice presidents' council; represent the project at board meetings; provide support to the project management team; and help the project team resolve complex issues that arise.

Project Manager 1 mentioned that the executive sponsors were in charge of determining sources of funds and putting together human resources as well as material resources. Executive sponsors approved contracts with software vendors, approved security and privacy policies and provided support to the project implementation team. Project Manager 2 mentioned that his project management team worked very closely with the executive sponsors on major project documents or shared such documents with them. This

project was initiated by one of executive sponsors, the Vice President for Student Affairs. The project strategic plan was developed by him over a two to three year time frame. This provided the project with a well documented case for moving forward with the ERP project.

Project Manager 7 emphasized that executive sponsorship was effective and important for the success of the process. Executive sponsors made major decisions when needed, stayed engaged as needed and resolved difficult situations when needed. He described a situation when the university was seeking tuition and fee increases at a state board meeting. The board, in search for cost reduction strategies, asked if the university could not reduce the ERP budget instead of asking for these increases. The Vice-President of Finance (a sponsor of the ERP project), who was making the presentation, claimed it was not possible to change an existing three-year budget commitment. He made a strong case. This was one example where executive sponsorship was extremely critical. Without this support at this very high level, an ERP budget reduction might have been approved, and this would have put the project in a difficult situation. Project Manager 7 mentioned that, while looking for an office for the ERP project management team, the President of the university offered them an office next to his. This sent a message to the campus on the importance of the project. These examples show that it is important to have strong executive sponsors and keep that executive sponsorship engaged. The quality of the sponsorship sends a message to the campus and helps create and sustain support.

For Project Manager 10, it was not possible to imagine an ERP implementation without strong executive sponsorship. In his view, executive sponsorship was needed not only for negotiating funds, but for discussions with different leadership groups within the institution, such as the Faculty Senate and the Vice Presidents' Council. Executive sponsors are needed during these critical discussions because they have the authority to make the case and address all major issues. Based on his long experience in information technology leadership in higher education, he thinks that universities were difficult places due to the decentralized nature of their governance. Every unit within the institution could be a point of veto. He saw a number of people who could negate a direction or effort. Without strong executive sponsorship to let everyone know that they needed to adhere to a direction, a

project could definitely encounter a lot of vetoes. Executive sponsor in the context of Project 10 played the following critical roles: monitor progress; help mitigate any flare ups with risk; approve certain decisions; determine certain hiring decisions on backfill dollars; approve any hire requiring a salary beyond a certain amount; help guide the project management regarding major problems encountered by project teams; and constantly revise and make adjustments to the budget.

4.7.3 Selecting Executive Sponsors

Our study found that executive sponsors were selected in different ways considering different criteria such as IT and functional expertise and stake in the project. ERP projects in higher education can have a top-down origin or a bottom up origin. When the project has a top-down origin, the executive sponsor is the person who initiated the discussion for implementation. This executive sponsor will select a project manager and put in place a project core team. In the bottom-up approach, the ERP project originated in the information technology unit or a functional unit and executive sponsors were identified later. In this bottom-up approach, the project had a project manager before finding a project sponsor. Project Manager 3 pointed out that their executive sponsors were asked by the project manager to be onboard because: 1) the business units reported to the Vice Chancellor of Student affairs and IT reported to the Vice Chancellor for Academic Affairs. Since the project manager was selected before project sponsors, he played a critical role in identifying the sponsors. And in selecting sponsors, he took into account executives' roles with regard to the units involved in the ERP implementation: the functional units and information technology. According to Project Manager 5, the executive sponsorship had to be the Provost or the Chief Operations/Administrative Officer.

For Project 7, executive sponsorship was well established before the project began. The university was committed and the executive sponsors selected the project manager. Since this ERP project had a top-down origin, it was less difficult to sell the project. Project 7 had two executive sponsors. One was the Vice President of Finance. Since finance was one of

the major modules. His commitment was needed. One the other hand, the academic wing was also important, so the Provost was needed.

The Provost is the Vice-President in charge of academic units such as colleges and departments. The Provost had to be effectively engaged in the overall project because he was in charge of making decisions about how the admission process works and how the registration process works. It was important to keep the academic wing informed and engaged in the process to provide guidance and directions. For Project 9 at a smaller institution, executive sponsorship included the President and the Vice President of Information Technology. As one of the executive sponsors, the Vice President of Information Technology, who initiated the discussion on the ERP project, was particularly active and helped moved the project forward. Table 4-6 summarizes executive sponsorship selection for all thirteen projects considered.

Based on our investigation of the thirteen projects considered for this study, it appeared that there was a correlation between the choice of executive sponsor and the ERP modules being implemented. ERP systems comprise several modules including 1) enrollment management: application, admissions/recruiting, registration, financial aid; 2) student services module: student portal, housing, parking and security, student health, placement; and 3) business module: student billing, fiscal management, human resources, and facilities. An institution may implement a few modules or all the modules. Even when all modules are implemented, this implementation can be done one module at a time over several years. In a top-down ERP implementation approach, usually the sponsor is the executive who wants to implement the ERP for his/her division. That would be the case when a VP of Finance and Administration decides to implement the ERP Finance and Human resources modules for his/her division. He/she has a direct stake in the project and he/she has direct authority over the functional units involved in the implementation. A VP of Academic Affairs/Provost can initiate an ERP project to implement the student module to run his/her division. In a bottom up approach where the project is initiated by some lower level staff (in IT or in a functional unit), to find an executive sponsor, the practice is to select a sponsor who is a stakeholder in the project and who has direct authority over functional units and teams. So if the project is to

start with the business module, the VP of Administration/Finance is seen as the right person. However, if the project is supposed to start with the student module, the VP of Academic Affairs/Provost is seen as the right person to serve as sponsor. Projects with a team of executive sponsors usually include executives who are stakeholders in the project. The following table summarizes project origins and sponsors selection for the thirteen projects considered.

Institution	Project Origin	Executive Sponsor(s) Selection	Executive Sponsor(s)
Project 1	Top down, initiated by an executive computing committee	Selected to cover modules being implemented	• Associate VP and Dean of Student Affairs • Associate VP for Research • Associate VP for Business Operations
Project 2	Top down, initiated by Vice-Chancellor for Student Affairs	Selected for overall authority and to cover modules being implemented	• Provost/Vice-Chancellor Students Affairs • Vice-Chancellor Business Affairs • Deputy CIO
Project 3	Bottom up, initiated by IT and functional units	Selected for overall authority and to cover modules being implemented	• Vice-Chancellor of Student Affairs • Vice-Chancellor for academic affairs
Project 4	Top down, initiated by university executives	Selected to cover modules being implement and to cover modules being implemented	• VP for Administration • VP for Academic Affairs
Project 5	Top down, initiated by university executives	Selected for IT expertise and responsibility and for overall authority	• CIO • Chief Operating officer
Project 6	Top down, initiated by university executives	Selected for overall authority, financial responsibility and for IT expertise and responsibility	• Chief financial officer • Provost • CIO
Project 7	Top down, initiated by university executives	Selected for financial responsibility and for overall authority	• VP Finance • Provost
Project 8	Bottom up, initiated by business and finance functional units	Selected for IT expertise and responsibility and for being representative of both VP for	• CIO (reporting to Provost and to Senior Vice President for Administration)

		Administration and Provost.	
Project 9	Top down, initiated by VP of Information Technology	Selected for overall authority and for IT expertise and responsibility	• President • Vice-President for Information Technology
Project 10	Top down, initiated by VP of Finance and Administration	Selected for financial responsibility and to cover modules being initially implemented	• VP for Finance and Administration
Project 11	Top down, initiated by the CIO	Selected for overall authority and for IT expertise and responsibility	• President • CIO
Project 12	Top down, initiated by university executives	Selected for IT expertise and responsibility, for overall authority, and to cover modules being implemented	• University Technology Officer (CIO) • Provost • VP of Student Services/Admission
Project 13	Top down, initiated by university executives	Selected for financial responsibility and for overall authority	• VP Finance • Provost

Table 4-6 : Executive Sponsors' Selection Table

This table shows the diversity of titles for executive sponsors, with each institution having its own organizational structure. It appeared that academic wings as well as administrative wings were well represented in addition to Information Technology. Almost all projects have more than one executive sponsor. The point is to involve stakeholders and executives who have functional expertise and authority over the units involved in the implementation. The list of executive sponsors shows the clear desire to involve several executives in charge of major areas deeply involved in the ERP project: information technology, business units, and the academic wing.

4.7.4 The Ideal Executive Sponsor

Characteristics for the ideal candidate for executive sponsorship will vary by institution since each institution has a unique organization and presents a unique context for ERP implementation. All project managers interviewed agreed that the ideal executive sponsor

would be a person who is enthusiastic about the project; a person who is one of the initiators of the project or an early adaptor of the project; a person who understands and is enthusiastic about the use of technology for the role and the use of information technology in higher education administration and research; a person who embraces innovative ideas and changes. For example, Project Manager 8 stated that the best executive sponsor should be the one who cares the most about the project and wants to be involved.

Project Managers 5 and 13 strongly believe that both the Vice President in charge of administration/Finance and the Vice President in charge of Administrative Affairs should be the executive sponsors. Within the context of academic institutions organization, the Vice President in charge of administration and finance is a person who has a critical role since many functional units, such as Human Resources and Finance, are within his jurisdiction. The strong support of such an executive can help make decisions and move the project faster on the administrative side. It will certainly be very helpful for the project in that he will understand all the major financial decisions. It will be easier to explain project budget decision to such a person. In addition, the academic wing is a key component of an academic institution. Having the Chief Academic Officer is a good idea. He/she would help make decisions and move things faster on the academic side. An executive sponsorship that includes the administrative as well as the academic sides of the institution will be ideal for the project.

Most projects have a panel of executive sponsors in charge of different parts. Project Manager 10 stated that for his project, it would have been a good idea to have an additional executive sponsor such as the Provost. The reason is that the help of the Provost would have been critical to implement ERP modules for functional units under his jurisdiction. This project manager stated that without this additional sponsorship, it was difficult to make decisions on things like student payment schedule, financial aid cycles, and financial aid group because the project did not have the strong support of the Provost. He stated that it took longer to receive decisions on the administrative side because the project manager had to go from the sponsor (VP of Finance) to the Provost and wait for an answer. He believed if the Provost were a sponsor, things would have moved faster. In his view, ERP projects in higher

education should have both the Provost and the VP of Finance and Administration as co-sponsors. For some projects, critical support for the project is the Chief Information Officer. In some institutions, this office is within the academic wing. In others, it is within the administrative wing. Another group of institutions sees a CIO office as a separate office, which is neither within the academic nor the administrative wing. In all cases, since ERP projects are information technology projects, the diligence of the CIO who is the executive in charge of technology is needed. This is why some institutions make the CIO a sponsor. Regardless of the unique situation, the basic executive sponsorship characteristics/criteria outlined in the literature review remain relevant.

4.7.5 Actual Involvement of Executive Sponsors

Executive sponsors had different levels of actual involvement in the ERP project. Project Manager 2 reported that the president of the institution was very supportive, but that he handed responsibility over to the Provost. The Provost proved to be an effective sponsor. As executive sponsor, he attended all the senior executive meetings; he attended and chaired all the executive committee meetings; and he attended every advisory committee meeting. He met and discussed the project frequently with the project manager and the deans. He made critical decisions to push the project forward. Project Manager 2 reported that their sponsors were asked to be on board and play the role of sponsors, because: 1) the business units reported to the Vice Chancellor of student affairs and 2) Information Technology reported to the vice chancellor for academic affairs. He reported that these two sponsors provided power to the project manager to identify who would be on the executive committee. Even though they were not actively involved, they supported the project manager in putting together the project team needed to steer the project. The executive sponsors had a low level of involvement.

The executive committee that empowered the project manager was more involved on a daily basis. This committee served as a major partner in implementing the project. Project Manager 6 reported that, the Chief Financial Officer was very involved. He would attend meetings on a weekly basis to get updates. The president and the provost would attend only

on a bi-weekly basis. When the project went live and there were problems, the President stepped in, chaired meetings, and made sure everybody understood that he would make sure that the problems were fixed. This involvement helped in the post-implementation phase of the project. These executive sponsors stayed committed and active throughout the project.

Project Manager 7 reported that he held weekly meetings with executive sponsors who needed to know what was going on. They wanted to be well informed to avoid unpleasant surprises. Project Manager 9 reported that Vice President for Information Technology was very much involved on a day-to-day basis, unlike the president who did not have much time. The Vice President was so involved that she appeared as the public face of the project. Project Manager 12 reported that their executive sponsors were involved in planning, seeking funds and maintaining continued support. They attended meetings as members of the Steering Committee and frequently met with the project manager for updates. In summary, executive sponsors played an active leadership role in: selling the idea and building support for the ERP project; finding human resources to staff the project; seeking funds and ongoing negotiation of budget; communicating important decisions and milestones to the academic community; reengineering business processes; making critical decisions to advance the project, and resolving conflicts within units and within the project.

4.7.6 Transitioning to another Executive Sponsor

Executive sponsorship turnover is known as one of the issues for ERP projects in higher education. This happens for different reasons: for instance, a sponsor moves to another position within the institution and is no longer involved in the project; a sponsor leaves the institution for another institution; a sponsor retires; a sponsor dies. Eight project managers (1, 2, 7, 8, 9, 11, 12, and 13) stated that they did not experience a turnover. Five project managers (3, 4, 5, 6, and 10) reported a turnover.

Project Manager 2 mentioned that they did not go through executive sponsorship turnover. However, he heard about turnover at other institutions, and in those instances, it took the project backward. Projects that did not experience executive sponsorship turnover saw that as a sign of stability that helped the project. They think that it was beneficial to work

with the same executive sponsors throughout the project. Project Manager 3 mentioned that both of the original sponsors left their positions, and were replaced by other sponsors. He reported that these original PMs were far more engaged and the new ones had no history. These incoming PMs did not want to deal with the complications. The turnover was challenging.

Project Manager 6 reported that during the implementation of the Student Administration module, they had a change of executive sponsor. The Provost who was the initial executive sponsor retired. The new Provost was less committed, particularly with regard to dealing with faculty request for changes. The previous Provost used to step in and put things in order. The new one was less willing to do that because he did not want to spend his tenure dealing with ERP the entire time. For projects that experienced executive sponsorship turnover, that situation created some instability and delays in the project schedule. It typically took a while to find a new sponsor or for the new sponsor to be capable.

4.7.7 Summary of Executive Sponsorship Issues

Based on the thirteen projects considered, it appears that some problems could arise in the areas of executive sponsorship. Choosing the wrong executive sponsor could be a problem. This could happen in cases when the project starts from the bottom up. Some information technology or functional units start discussion about the project, then they go to an executive for his/her sponsorship. They may approach such an executive considering his/her position in the institution. Some sponsors may not be enthusiastic about the project because s/he is not motivated. However, this executive may not refuse. A sponsor may accept a role that he/she is not eager to support. In such cases, his/her support will not be effective. He/she may not be able to play the full role that the project expects from him/her to play. This situation can have an adverse impact on the project in view of the critical role of executive sponsors. A complete lack of executive sponsor may be a major problem.

In some situations the executive sponsor does not believe in the new system. A project may choose the Vice President of Finance/Administration as executive sponsor because of his/her responsibilities in functional areas. However, this Vice President who

130

accepts being the sponsor may not believe in the ERP system because; 1) it is too complex to understand; 2) he/she heard stories about ERP implementation that went wrong at other institutions; or 3) he/she thinks that the legacy systems are doing well. If such a sponsor does not remove him/herself from the project, it is obvious that the project will run into trouble. He will not be able to provide support for a system he does not believe in.

Some of the project managers mentioned that some executive sponsors got involved in ERP projects because someone had asked them. Typically, such sponsors are not motivated and do not make the project a priority. In such a situation, the project will run into problems. Some executive sponsors are very committed to the project, but they have limited technical knowledge. Due to this limited knowledge, they do not understand issues, or when they do understand, they do not understand fast enough. This results in a slow decision making process or in making wrong decisions. This will certainly have an adverse impact on the project. In other cases, personal conflicts may arise between the executive sponsor and other key players such as the project manager. When internal politics and power struggles come, the project suffers.

4.8 Discussion

4.8.1 Revisiting our Research Questions

The purpose of our study was to find answers to questions such as: who is the executive sponsor? What is his/her role? How is he selected? How does he/she participate effectively in the implementation? Sections 4.7.1 through 4.7.7 of this paper provide ample answers to these questions. The executive sponsor is a high-ranking officer within the institution directly related to the ERP project by virtue of his/her position. The executive sponsor is a major stakeholder and "owner" of the project who secures buy-in, resources and makes decisions for advancement. In a top-down ERP project, the executive sponsor volunteers him/herself or is selected by other executives. In a bottom-up project, the executive sponsor is approached by functional units or IT staff members who initiated the project. Executive sponsors take active part in the project attending meetings, leading steering committees, engaging the

campus community for the project, seeking and securing resources, and supporting the project manager and project teams. The vast majority of projects use a team of executive sponsors. A high percentage of projects experience sponsorship turnover.

4.8.2 Comparison with Previous Studies and the PMBOK

Our study concurs with trade/practitioners' literature, research literature and research studies of CSFs that emphasized executive sponsorship as a critical success factor. Studies on CSFs considered in the literature review all listed executive sponsorship as a key factor. Our study confirms that executive sponsorship is a critical success factor. Our study agrees with the project sponsor's definition provided by the PMBOK as well.

Beyond these points of convergence with previous studies and the sponsor definition of the PMBOK, our study identified executive sponsorship issues specific to higher education not discussed in the literature. Executive sponsor selection is related to the ERP modules being implemented and the organizational structure of each academic institution. The point is to select the executive (or a group of executives) in charge of divisions that will receive the ERP modules. Functional, technical (information technology) and financial expertise and authority are important in selecting sponsors. This is why most institutions have a panel of sponsors to avail themselves of all forms of expertise and authority. Another factor not discussed in the literature reviewed is executive sponsorship turnover. Executive sponsorship turnover is a significant issue since five out of the thirteen projects considered experienced executive sponsorship turnover. In all of these cases, the project lost to executive sponsors to retirement or the sponsor left for another job in another institution. The table below presents executive sponsorship issues identified by our study.

Executive Sponsorship Issues Identified by our study	
Issue	Comments
Relationship between source of project (top down or bottom up) and choice of executive	The origin of the project affects the choice of the sponsor. In a top-down approach, an

sponsor	executive volunteers as sponsor or is chosen by top management. In a bottom-up approach, there is a risk of choosing the wrong sponsor.
Relationship between ERP modules being implemented and executive sponsor selection	The ERP project works best when the sponsor is the executive in charge of the units/divisions receiving the modules to be implemented. Such an executive can make decisions with more impact on his/her staff.
Choosing the wrong sponsor (usually in bottom-up project)	It is about choosing a sponsor who is not enthusiastic or motivated by the project, but who accepts to be the sponsor. Such a sponsor does not provide the strong support needed.
Choosing a skeptical sponsor	An executive who does not believe in ERP systems or who does not think that an ERP system is needed, but who accepts to be the sponsor because he/she was asked.
Choosing a sponsor with limited technical knowledge	An executive with strong credentials in other fields, but who does not understand technology enough to sell and lead the project.
A sponsor with other priorities	Since most executives are busy with several projects and priorities, with all the good will, a sponsor may not have enough time to focus on the ERP project as needed. A sponsor may be more focused on his/her retirement planning than on an ERP that will take several years.

Conflict between sponsor and other key players such a project manager	In the course of a project, conflicts may arise between key players. If not resolved quickly and adequately, such a conflict will impact the project.
Power struggle between sponsors and/or between sponsors and other executives	Power struggles are inherent to human organizations. Struggles may arise within a panel of sponsors or between sponsors and other executives within the institution.
Executive sponsor turnover	A sponsor leaves a project for retirement, for another institution or for some other reasons.

Table 4-7 : Summary of executive sponsorship issues identified

These executive sponsorship issues that our study identified in the academic context would be relevant for non academic contexts as well.

4.8.3 Executive Sponsorship Selection Table

Based on our study of the thirteen projects considered, we proposed a set of criteria for selecting executive sponsors. Our field experience indicated that projects could not prosper and succeed without executive sponsorship. Is it possible to establish rules that could guide executive sponsor selection? Because the ERP project touches all aspects of the academic institution and the human side is so important, it is hard to put in place a schema that allows us to mechanically select an executive sponsor. However, we can discuss criteria that will help in the executive selection process. Since the goal is to select an effective executive sponsor, one should consider the following criteria (in the table below) that appear to be particularly pertinent.

Criteria	Definition/Comment
(1) Overall professional/academic qualifications and authority within the institution	Since the ERP project is a large scope, high impact project within the institution, it takes a high-ranking, high profile executive with proper authority to mobilize the academic community and to make authoritative decisions. This criterion is the one that makes executives such as VP of Academic Affairs, VP of Administration/Finance or even the University President good candidates for the sponsor position.
(2) Information Technology expertise	Since the ERP project is an information technology project, it takes an executive with IT knowledge to understand information technology issues and make relevant technology decisions. This criterion is the one that makes the Chief Information Officer/Chief Technology Officer a good candidate for the sponsor position.
(3) Financial authority and responsibility	The ERP project costs a lot of money and involves a lot of financial decisions. For this reason, it is important to have on board the executive in charge of finances. This criterion is the one that makes the VP of Finance a good candidate for the sponsor position.
(4) Stake in the project	In view of the complexity, the difficulty and the time involvement of the ERP project, only an executive who has a professional stake in the project will put in the effort to make it a success. This is why is it important to involve executives whose divisions/units are directly involved and who will benefit from a successful implementation. For instance if the VP of

	Finance of an institution needs an implementation of the Finance module of the ERP application to run his/her department efficiently, he will be motivated to do all it takes to make the project a success.
(5) Authority over units involved in the project	The ERP requires that important decisions be made concerning functional units involved in the implementation. Staff members in these units need to be mobilized for the project and decisions need to be made concerning job restructuring and redesign. Sometimes, it takes the executive in charge of specific units to make appropriate authoritative decisions for these units/divisions.
(6) Type of ERP of implementation/modules to be implemented)	This criterion refers to the choice of implementing a full ERP system with all modules or a partial implementation with selected modules. The modules to be implemented will help determine the executives who will be stakeholders and who will have the qualifications and the motivation to make the project a success.
(7) Probability of turnover	The probability of executive sponsor turnover is a point to consider judging by the rate of executive turnover for the thirteen projects considered. However, one may not always be able to predict what will happen in a few years.

Table 4-8 : Executive Sponsor Selection Criteria Table

The seven criteria above are important. Based on the institutional context and the type of implementation some criteria will be more important than others. Since it is not always possible for a single person to meet all of these criteria, institutions use more than one person

136

to satisfy the criteria. This is why the vast majority of ERP projects have more than one sponsor.

4.9 Conclusion

This paper points the importance of ERP project executive sponsorship issues in higher education. Our study confirms the relevance of previous studies that mentioned executive sponsorship as critical to success. Based on thirteen projects considered, one could say that it takes the strong support and authority of an executive sponsor to make an ERP project successful. The literature reviewed and our study of thirteen projects indicates that executive sponsorship is imperative, a condition for all projects before other critical success factors.

Working on thirteen projects at thirteen different institutions was beneficial. However, we had to limit our field work to project managers who accepted our interviews. We limited our study to the standpoint of the ERP project managers. This is our methodological choice. However, this choice gave us only the standpoint of the project manager, excluding other perceptions and perspectives on ERP project management. A study that takes into account information from various staff members on ERP projects will provide diverse perspectives.

Many project managers we interviewed had already completed the project. This could be considered a limitation of our study. At that point, their assessments of sponsorship reflected their memories. These assessments could have been different while they were on the project or at the end. On the other hand, some of the PMs were in action on the project at the time of our interviews. Their assessments could reflect immediate contingencies. They could have different assessments later.

Future research avenues include: systematic comparison of ERP executive sponsorship issues in the corporate world and in higher education; dedicated studies of the impact of executive sponsorship issues on different aspects of the project including ERP project communication; ERP Project training issues; ERP project quality assurance; ERP project budgeting and finance; ERP project risk assessment and mitigation; and ERP software package customization. It is equally important to study executive sponsorship issues for

137

different types of institutions (for example, community college versus a big research university), for ERP projects in private versus public universities and for ERP projects in American universities versus projects in academic institutions in Canada, Western Europe or in other places.

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4.11 Appendix 1: Questionnaire

This appendix presents the list of question used for the semi-structured interviews with ERP project managers.

Questions:

- Could you give me an overview, a background on your ERP Project?

- Could you provide an overview, a background on executive sponsorship issues? In your opinion, what are the greatest challenges in the area of executive sponsorship?

- How was executive sponsorship secured for the project and who was the project's executive sponsor?

- How were the executive sponsors involved? Were they attending meetings, making suggestions, and seeking funds and support throughout the university?

- How effective was the executive sponsor in advancing the project?

- Did you observe a decrease of interest from the executive sponsor or any other top executive in the project? What was the impact on the project?

- Did you experience executive sponsorship turnover? At what point did you resolve the executive sponsorship turnover?

- What was the impact of the executive sponsorship?

- What was the impact of executive sponsorship turnover or loss of interest on the finance and on schedule?

- How critical was executive sponsorship for project success?

4.12 Appendix 2: Interview Excerpts

Project Manager 2:

"The Vice-Chancellor for Student Affairs initiated the project. That is where the strategic planning occurred. They knew the kind of service that they wanted to offer the student body that we could not do. The strategic planning document and the needs of students help us make a very strong case. The project came from the top. The executive sponsor was the Vice-Chancellor for Student Affairs. Actually there were three sponsors: the Vice-Chancellor for Student Affairs, the Deputy CIO and the Vice-Chancellor of Business Affairs."

Project Manager 3:

"Both of the original sponsors left their positions and they were replaced by others. These original were far more engaged. The new ones had no history and they did not want to deal with the complication. The turnover was challenging and we had to deal with that."

Project Manager 4:

"Executive sponsorship was very critical. The project would have failed without executive sponsorship.

Project Manager 5:

"The executive sponsorship has to be at the highest level. Some of that will depend on the organization. You need the approval of the President. In most cases, the Provost or the Chief Operating Officer would be the right person. In some cases, it would be the Provost, and in others, it would be the Chief Administrative Officer. But it has to be at that level.. And certainly, the CIO is part of that executive sponsorship. The sponsors are: the CIO, and the Chief Operating Officer."

"Executive sponsorship is very critical. ERP implementation is hard and painful. People could say at some point, they we are not going to do this. If you don't have executive sponsorship saying, hey we're going to do this, it can delay the project, drag it out and in some cases you will never get it in place. I won't even start a project without executive sponsorship."

Project Manager 6:

"There were four executive sponsors: the Chief Finance Officer, the Provost and the President and myself. I was director of IT and CIO when I started the project. I became vice-president of IT in 2004."

"The chief financial officer was very involved. He would attend meetings on a weekly basis to get updates. The President and the Provost would attend only on a bi-weekly basis. When we went live and there were problems, the President stepped in, chaired meetings and made

everybody understand that we would get the problems fixed and he would make sure of that. And that really helped in the post-implementation aspect making sure that we could get through issues."

Project Manager 7:

"Executive sponsorship was very effective, very important for the success of the process. They have made decisions when needed, they have been engaged when needed, they have resolved difficult situations when needed."

"I have not experienced executive sponsorship turnover. But, I have heard about that. Let me describe a situation. There is a State Board meeting. They university is asking for tuition and fee increases. The Board asked if they could not reduce the ERP budget. The VP of finance who was making the presentation said it was not possible to change the three years budget commitment. He made a very strong case. This is one example of where executive sponsorship is extremely critical. If they chose to think about that as an option to consider, that would have jeopardized the project. These things happen at other institutions. That is why it is important to keep that executive sponsorship engaged."

Project Manager 8:

"Without a doubt, the President and the Provost have to be on board. If they are not going to support you publicly, you will fail. Secondly, they need to make it clear that whoever the executive sponsor is, they are in charge, that there is no back door to the President's office to make goofy changes. And in both cases, I was successful with those. I was the executive sponsor and I had the support of the Provost and the President."

"Whoever cares the most about the project is the best person to be the executive sponsor. I am not talking about title. I am talking about people wanting to be involved. If the Provost believes that IT is key to his survival, I will let the Provost be the executive sponsor. If the CIO knows that their job depends on this project, I will let the CIO be the Executive Sponsor. You have to care about it. The executive sponsor has to be a high ranking officer who cares about the project."

143

Project Manager 11:

"The CIO approached the President and the board of trustees. Then we had to working individually with other officers. Some of them did not want the new system. The Finance VP was fine with the old system. He did not see any reason to change. The key factor was the President. He he was supportive and if he did not made it clear that we're going to have a vanilla implementation, we would have had many problems. With the project this size, executive sponsorship should include the VPs and then Deans.

Project Manager 12:

"At our institution, the Provost left. There was a new Provost. It worked to the project's advantage. The previous Provost provided a kind of weak support. He did not want to spend the money. The new Provost provided a stronger endorsement. He was a quick decision maker. It certainly helped the project. The project was not delayed. It helped the project."

Conclusion

Contributions

La présente thèse s'est consacrée à trois aspects de la gestion des projets de mise en œuvre des systèmes ERP en milieu universitaire. Le premier aspect a porté sur le point de vue des chefs de projet concernant les défis et les difficultés inhérentes à la gestion des projets ERP en milieu universitaire. Une comparaison de la présente étude avec les études prises en compte dans la revue de la littérature a permis d'établir les points de convergence et les points de divergence. Les études antérieures sur les systèmes ERP dans l'enseignement supérieur 1) ont documenté des systèmes ERP en milieu universitaire ; 2) ont présenté les leçons apprises et 3) ont souligné les différences entre les institutions académiques et les autres organisations. La présente thèse confirme la pertinence de ces études antérieures, surtout en ce qui concerne l'identification et l'analyse systématique des facteurs critiques de succès dans le cadre de la mise en œuvre des systèmes ERP. La présente thèse confirme que les institutions académiques représentent un type spécifique d'organisation avec leurs activités et leurs modes de fonctionnement. Ces différences ont des incidences réelles sur la mise en œuvre des systèmes ERP comparativement au milieu des entreprises. La présente thèse confirme le caractère spécifique des institutions universitaires qui se traduit par des difficultés et des défis spécifiques.

Le travail de terrain a permis d'identifier des questions supplémentaires absentes de la littérature examinée. Par exemple, le chef de projet 4 a fait état de problèmes/difficultés techniques dans les différents modules du système ERP. Le chef de projet 7 a mentionné les deux questions suivantes : 1) le manque de personnel pour faire fonctionner deux systèmes d'information (l'ancien et le nouveau) en parallèle pendant une période de transition et 2) la synchronisation des données dans les deux systèmes en parallèle. Tous les chefs de projets

145

des institutions académiques prises en compte ont mentionné des contraintes liées au calendrier universitaire (le système de semestre) au cours du processus de mise en œuvre des systèmes ERP.

Pour classifier les facteurs critiques de succès dans le cadre de la mise en œuvre des systèmes ERP, la présente thèse a eu recours au référentiel des connaissances en gestion de projets (PMBOK). Le PMBOK comprend les domaines de connaissance suivants : gestion de l'intégration du projet, gestion du domaine d'application du projet, gestion du temps de projet, gestion des coûts du projet, gestion de la qualité du projet, gestion des ressources humaines du projet, gestion de la communication du projet, gestion des risques du projet et gestion des achats du projet. La présente étude a permis d'associer différents facteurs critiques de succès des systèmes ERP aux différents domaines de connaissances du PMBOK. Cependant certains facteurs critiques de succès ne se retrouvent pas dans les différents domaines de connaissances du PMBOK. La présente étude a ajouté de nouveaux domaines pour prendre en compte ces facteurs additionnels. Il s'agit des domaines suivants : (1) facteurs techniques/technologie de l'information, (2) facteurs propres au domaine d'application et (3) facteurs locaux/propres à chaque projet.

Au niveau du deuxième aspect portant sur les tactiques et les difficultés dans le domaine des ressources humaines, la présente étude a permis de découvrir que 1) la plupart des chefs de projet ont acquis la plus grande partie de leur personnel au sein de l'institution en déplaçant des personnes de leurs postes initiaux vers le projet ERP et 2) tous les chefs de projet ont recruté du personnel à l'extérieur et ont eu recours à des consultants extérieurs. La grande majorité du personnel recruté au sein de l'institution a maintenu l'emploi d'origine tout en assumant les responsabilités au sein du projet ERP. Tous les projets ont utilisé une tactique de remplacement temporaire de personnel pour permettre aux différentes unités de l'institution de fonctionner correctement pendant que le personnel permanent de ces unités travaillait sur le projet ERP. Par ailleurs, tous les chefs de projet ont acquis du personnel nécessaire à l'extérieur en proposant des salaires plus élevés et ils ont maintenu ce personnel au moyen de différentes tactiques telles que les compensations financières supplémentaires, les vacances et la reconnaissance verbale des efforts et du mérite. Les chefs de projet ont

résolu les conflits et maintenu la motivation et le moral du personnel en utilisant diverses techniques, y compris des discussions ouvertes, les négociations, l'arbitrage, les compensations financières, la célébration des acquis du projet et le soutien moral.

Tous les projets ont utilisé du personnel interne et externe dans des proportions différentes à temps partiel ou à temps plein à différents stades du projet. Pendant la phase préliminaire de mise en œuvre, l'objectif était de planifier et de budgétiser les ressources humaines pour le projet. Pendant la phase de mise en œuvre proprement dite, il était question de gestion des ressources humaines au quotidien. Il s'agissait de réunir l'équipe du projet, d'engager cette équipe et de maintenir cet engagement pendant toute la durée du projet. Il s'agissait de repartir les tâches et les responsabilités, d'assurer le suivi au, niveau de l'exécution des tâches, de résoudre les conflits au sein des équipes, d'encourager et de récompenser l'effort des uns et des autres. La phase d'exploitation (après la mise en œuvre proprement dite) met l'accent sur l'utilisation et l'entretien du système ERP tout en réduisant le personnel.

Dans le domaine des ressources humaines, la présente étude a permis de faire ressortir des scénarios, les contraintes et les implications de ces scénarios. Ces scénarios se résument ainsi : des projets ERP peuvent mettre en place leurs équipes avec du personnel interne ou externe et les membres de ces équipes peuvent être utilisés à temps plein ou à temps partiel sur le projet. Les contraintes suivantes jouent un rôle important dans le choix des scénarios : (a) contraintes budgétaires/financières, (b) disponibilité des ressources humaines nécessaires en interne et en externe ; (c) contraintes de temps/calendrier. Ces trois contraintes représentent les contraintes les plus visibles. S'il est économiquement viable d'utiliser du personnel interne et que le budget est limité, les projets ont tendance à compter davantage sur le personnel interne. Si un personnel technique externe permettait au projet d'avancer plus rapidement et qu'il n'y a pas de problèmes budgétaires, le projet s'appuie sur cette expertise externe. La plupart des projets utilisent une combinaison de personnel interne et externe travaillant à temps plein et/ou à temps partiel sur le projet. La combinaison de la source du personnel (interne et externe) et du temps du personnel (temps plein et temps partiel) donne les scénarios suivants: Interne/Temps plein (i), Externe/Temps plein (ii), Interne/Temps

147

partiel (iii), Externe/Temps partiel (iv), Source hybride/Temps plein (v), Source hybride/Temps partiel (vi), Interne/Temps hybride (vii), Externe/Temps hybride (viii) et Source hybride/Temps hybride (ix).

Par exemple, le scénario «Interne/Temps plein (i) » se réfère à un projet qui utilise un personnel entièrement interne qui travaille à temps plein sur le projet. Le scénario «Externe/Temps plein» se réfère à un projet utilisant un personnel entièrement externe travaillant à temps plein sur le projet. Chaque scénario a des conséquences spécifiques sur le projet dans les domaines suivants: formation du personnel du projet, formation des utilisateurs finaux du système ERP, échéancier du projet, mise en place des équipes de projet, travail en équipe sur le projet, expertise technique/technologique requise, expertise d'affaires requise, temps nécessaire pour que les équipes développent la compétence, gestion des ressources humaines, moral/motivation de l'équipe de projet, coût des ressources humaines/personnel et coût global du projet (y compris salaires, primes et autres compensations monétaires). Pour les besoins de l'analyse, les domaines suivants -- qui pourraient être touchés de différentes façons par chaque scénario – ont été retenus : Perturbation du service dans les domaines d'affaires, Expertise d'affaires sur le projet, Expertise technique sur le projet, Formation d'affaires pour le projet ERP, Formation technique pour le projet ERP, Échéancier du projet et Coût du projet.

La présente étude a établi une matrice d'acquisition des ressources humaines dans le cadre des projets ERP en milieu universitaire en tenant compte des différents scénarios et de l'incidence de ces scénarios sur différents aspects importants du projet. Les scénarios et leurs incidences déterminées sont des tendances sur la base des données recueillies. Il est nécessaire de mener des études/recherches supplémentaires afin de confirmer ces tendances. A titre d'exemple, pour le scénario (i) il y aura de fortes perturbations de service dans les unités d'affaires en raison du déplacement de personnel des unités d'affaires vers le projet. Ce personnel interne ayant une expertise dans les domaines d'affaires, la nécessité d'une formation dans ce domaine est faible. D'autre part, puisque ce personnel interne n'a pas l'expertise technique dans le domaine du système ERP, le besoin de formation dans ce domaine est élevé. L'échéancier du projet sera moyen puisque le temps gagné en expertise

d'affaires sera réduit par le temps perdu par le manque d'expertise technique. Le coût du projet sera faible parce que l'acquisition des ressources humaines en interne coûte beaucoup moins cher.

Au niveau du troisième aspect portant sur le parrainage du projet ERP par un ou plusieurs membres de la direction de l'institution, la présente thèse a permis de confirmer que le parrain est un cadre de haut rang au sein de l'institution, une personne liée au projet ERP en vertu de son poste. Ce parrain est un acteur majeur, en quelque sorte le «propriétaire» du projet qui se charge de garantir l'acceptation de l'idée du projet, de rechercher et de pourvoir les ressources et de prendre les décisions fermes et critiques pour l'avancement du projet. Dans un projet ERP initié par la direction de l'institution, le parrain se propose comme volontaire ou il est choisi par les autres administrateurs de haut rang. Dans un projet initié par le personnel de niveau inférieur, les membres des unités d'affaires ou du département de l'informatique proposent le parrainage à un haut cadre qu'ils jugent bien placé pour jouer ce rôle. Dans un cas comme dans l'autre, le parrain prend une part active dans le projet en participant aux réunions, en dirigeant le comité de pilotage, en mobilisant la communauté universitaire autour du projet, en pourvoyant les ressources nécessaires à court et à moyen terme et en soutenant le chef de projet et les équipes du projet. La grande majorité des projets utilise un système de parrainage comprenant plusieurs hauts cadres afin de garantir le soutien le plus large possible. Plusieurs projets perdent leur parrain au cours du projet.

La présente thèse confirme la pertinence de la littérature des professionnels et des chercheurs qui présentent le parrainage des projets ERP comme un facteur critique de succès. La présente thèse confirme également la définition du parrain du projet fournie par le PMBOK. Au-delà de ces points de convergence, la présente thèse a identifié des problèmes spécifiques au parrainage des projets ERP en milieu universitaire qui ne sont pas documentés dans la littérature. En effet, en milieu universitaire, la sélection du parrain est liée aux modules ERP à mettre en œuvre et à la structure organisationnelle de chaque institution universitaire. L'objectif est de sélectionner un parrain ou un groupe de parrains responsable des unités qui déploient les modules ERP. L'expertise et la responsabilité aussi bien dans les domaines d'affaires que dans le domaine de la technologie de l'information et dans le

domaine financier revêtent une importance particulière dans la sélection des parrains. C'est la raison pour laquelle la plupart des établissements s'octroient une équipe composée de plusieurs parrains afin de s'assurer toutes les expertises et autorités nécessaires. Une autre question non documentée dans la littérature examinée et que la présente étude a identifiée est la question de la perte du parrain du projet. En effet, cette question est importante en milieu universitaire vu que cinq des treize projets pris en compte ont perdu leur parrain au cours du projet.

L'étude a proposé un ensemble de critères pour la sélection du parrain du projet ERP en milieu universitaire. Ces critères sont les suivants : qualifications professionnelles et académiques et autorité au sein de l'institution ; expertise en technologie de l'information; autorité et responsabilité en matière financière; intérêt et engagement de sa responsabilité dans le projet; autorité sur les unités impliquées dans le projet ; modules ERP à mettre en œuvre; probabilité de perte du parrain. L'importance de ces critères variera en fonction du contexte institutionnel et du type de mise en œuvre. Dans un contexte précis, certains critères peuvent paraître plus importants que d'autres. Comme il n'est pas toujours possible pour une personne seule de répondre à tous ces critères, les institutions utilisent plus d'une personne afin de satisfaire à plusieurs critères dans le contexte du projet. C'est la raison pour laquelle la grande majorité des projets ERP s'offrent plus d'un parrain.

Critique du travail

Il a été utile de travailler sur treize projets au sein de treize différentes institutions. Cependant, la présente thèse a dû se limiter aux chefs de projets qui ont accepté les entrevues. L'étude s'est limitée au point de vue de ces chefs de projets. C'est le choix méthodologique fait pour la présente thèse. Cependant, force est de reconnaître que ce choix n'a permis d'avoir que le point de vue des chefs de projets, à l'exclusion d'autres perceptions et perspectives sur la gestion des projets ERP. Une étude qui prend en compte diverses données collectées auprès de plusieurs acteurs ayant participé aux projets ERP fournira divers points de vue sur ces questions. Plusieurs chefs de projets interrogés n'étaient plus dans un rôle de

gestion de projet au moment des entrevues. Ils avaient déjà terminé leurs projets. Ce fait peut être considéré comme une limite de la présente étude. Au moment des entrevues, leurs avis sur les difficultés et défis étaient basés sur leur mémoire. Peut-être que ces avis auraient été différents au moment où ils étaient sur le projet ou à la fin du projet. D'autre part, certains chefs de projets étaient en activité sur le projet au moment des entrevues. Les avis de ces chefs de projets en action peuvent refléter les contingences immédiates. Ils pourraient avoir des avis différents plus tard, à la fin du projet.

Travaux futurs de recherche

Dans le cadre de recherches futures, l'on peut explorer les axes de recherche suivants : une comparaison systématique de la mise en œuvre des systèmes ERP dans les entreprises et dans le milieu universitaire, des études portant spécifiquement sur la communication, la gestion des systèmes existants et la conversion des données, les questions de formation, l'assurance qualité, la budgétisation et les finances dans le cadre des projets ERP. Il est également important d'étudier : l'incidence de la politique et des luttes pour le pouvoir au sein des projets ERP en milieu universitaire; une comparaison des projets ERP au sein des universités privées et publiques ; une comparaison des projets ERP au sein des universités américaines et d'autres institutions universitaires dans d'autres pays en Amérique du Nord, en Europe et dans d'autres régions du monde. De même, il sera utile d'étudier l'applicabilité du modèle CMMI à la mise en œuvre des systèmes ERP en milieu universitaire.

Dans les domaines de ressources humaines et du parrainage des projets ERP, des recherches futures peuvent porter sur: une comparaison systématique des questions des ressources humaines et/ou du parrainage des projets ERP dans les entreprises et dans les universités ; l'impact des questions de ressources humaines et/ou parrainage sur des aspects spécifiques du projet tels que la communication, les questions de formation, l'assurance qualité, le budget et les finances, l'évaluation et la gestion des risques et les modifications du logiciel ERP. Il est également important d'étudier les questions des ressources humaines et/ou de parrainage pour différents types d'institutions (par exemple, un collège communautaire

par rapport à une grande université de recherche) et pour les projets ERP dans les universités privées par rapport aux universités publiques.

Perspective

Le domaine de la mise en œuvre des systèmes ERP dans le monde des entreprises et en milieu universitaire est un domaine en pleine croissance. De plus en plus d'organisations s'octroient des systèmes ERP. Les progiciels ERP connaissent une évolution constante du point de vue de la diversité des domaines d'application et de la qualité même de ces applications. Les mises en jour régulières remettent au goût du jour ces logiciels. La recherche sur la mise en œuvre des systèmes ERP restera pendant longtemps un domaine de recherche très fécond qui – pour être exhaustif – aura besoin de l'engagement de plusieurs équipes pluridisciplinaires comprenant des spécialistes des systèmes d'information/informatique, du génie logiciel, de la gestion de projet ainsi que des spécialistes des différents domaines d'application.

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155

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