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BUSINESS ADMINISTRATION**

**MASTER THESIS**

**A VIRTUAL KNOWLEDGE DISSEMINATION PLATFORM DESIGN FOR  
MANAGING INDUSTRY AND UNIVERSITY RELATIONS IN TURKEY**

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## **ABSTRACT**

### **A VIRTUAL KNOWLEDGE DISSEMINATION PLATFORM DESIGN FOR MANAGING INDUSTRY AND UNIVERSITY RELATIONS IN TURKEY**

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Increasing the collaboration between university and industry is currently one of the most focused topics in Turkey. Regarding the fact that Knowledge Management principles becomes a vital element in executing organisational activities, the aim of this research thesis is to design a web-based platform for knowledge dissemination purposes between university and industry, as an important stage of knowledge management process. For this purpose, after following the reasons for need for collaboration and related knowledge management literature review, the design of a multifunctional platform we called “UNICBazaar” that aims to facilitate the collaboration between both parties has been introduced. In this context, UNICBazaar provides consulting, recruitment, project search, information sharing and exchange services by using computer based channels, synchronous and asynchronous tools. It is expected that UNICBazaar will enhance and simplify Knowledge Transfer process among knowledge, consulting and solution seekers and other stakeholder who are willing to be part of a collaborative process.

**Keywords:** University-Industry Collaborations, Knowledge Dissemination, Knowledge Dissemination channels, Web based Collaborative Platform

**ÖZET**  
**TÜRKİYE'DE SANAYİ VE ÜNİVERSİTE İLİŞKİLERİ YÖNETİMİ İÇİN**  
**SANAL BİLGİ YAYGINLAŞTIRMA PLATFORMU TASARIMI**

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Üniversite ve sanayi arasındaki işbirliğinin artırılması şu anda Türkiye’de en çok odaklanılan konulardan biridir. Bilgi Yönetimi esaslarının örgütsel faaliyetlerin uygulanması sırasında hayati bir etken olduğu göz önüne alındığında bu araştırma tezinin amacı üniversite ve sanayi arasında bilgi yayma hedefli bir web-tabanlı platform tasarlamaktır. Bu yönde, işbirliği ihtiyacının amaçlarının gözlemlenmesi ve ilgili bilgi yönetimi literatürü taranmasını takiben, UnicBazaar olarak adlandırdığımız ve iki taraf arasındaki işbirliğini kolaylaştıran çok fonksiyonlu bir platform tanıtılmıştır. Bu çerçevede UnicBazaar, bilgisayar tabanlı kanalları, senkronize ve asenkronize araçları kullanarak danışmanlık, işe alım, proje tarama, bilgi paylaşımı ve değişim hizmetleri sağlamaktadır. UNICBazaar'ın bilgi, danışmanlık ve çözüm arayanlar ile işbirliği sürecinin bir parçası olmak isteyen diğer paydaşlar arasındaki bilgi transfer sürecini sağlayıp kolaylaştırması beklenmektedir.

**ANAHTAR KELİMELER** : Üniversite-Sanayi İşbirlikleri, Bilgi Yaygınlaştırma, Bilgi Dağıtım kanalları, Web tabanlı Ortak Platformu

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## LIST OF SYMBOLS / ABBREVIATIONS

ICT	information and communication technology
KM	Knowledge management
SECI	Socialization, Externalization, Combination, Internationalization
IT	Information technology
e-library	electronic library
HP	Hewlett-Packard
ESP	Electronic Sales Partner system
XML	Extensible Markup Language
NGOs	Nongovernmental organisations
R&D	Research and Development
I/UCRC	Industry and university cooperative research centre
NSF	National Science Foundation
CISE	Computer and Information Science and Engineering centres
URC	The University research corridor
MIT	Massachusetts Institute of Technology
NTT	Nippon Telegraph and Telephone
DAMVAD	research based consultancy on the behalf of university of Copenhagen
SME	small and medium size enterprises
SMIDO	Small and Medium Sized Enterprises Development Organizations
SANTEZ	Industry dissertations thesis projects
USİMP	University Industry Collaboration Centers Platform
GUSIAP	Gaziantep Üniversitesi Sanayi İşbirliği Projesi
ÜSAK	University/Industry Cooperation Coordination Center/ Istanbul Aydın
University	
EBİLTEM	Ege University Industry Services Office

HTML	Hyper Text Markup Language
CV	Curriculum Vitae
URL	uniform resource locator
FAQ	Frequently Asked Questions
EU	European Union
TUBITAK	the scientific and technical research council of turkey
CUMGPA	cumulative Grade Point Average
HACCP	<i>Hazard analysis and critical control points</i>
ISO	International Organization for Standardization
TSE	<i>Türk Standardları Enstitüsü</i>
ASE	algorithm of the searching engine
ATC21S	Assessment and teaching of 21 <sup>st</sup> century skills
TUM	technical university of Munich ETH Zurich ETH Zürich - Eidgenössische Technische Hochschule Zürich
GPS	<b><i>Global Positioning System</i></b>
OST	<b>L'Observatoire des sciences et des technologies</b>
CIRST	Centre interuniversitaire de recherche sur la science et la technologie
YOK	commission for the higher education in turkey
SIC	standard industrial classification code
DZI	Day & Zimmermann
KPU	Key Person University





## **INTRODUCTION**

Regarding the current state of the world and the rapid technological development the need for knowledge in both theoretical and practical forms in a competitive environment, universities and firms considered as the two essential foundations that contribute in the economic growth and knowledge creation and development in a community. For centuries, firms and universities interacted with each other to build a solid base in creating theoretical and practical knowledge and transforming the knowledge to its practical and useful form through transferring it to the parties who are concerned with developing it.

With a high social expectations by universities, industry members, governments, researchers and individuals involved both academic and industrial researches in a competitive environment, the interaction may be seen through the collaboration between any parties in the R&D processes with expectations of beneficial returns to both sides as a result for the collaboration and its expected effect on the economic performance.

This mutual relationship can lead to great outcomes on the welfare of the collaborative group as it may be seen through commercializing the universities' inventions, innovation, and the accumulated output of many years' researches and publications into public's use via the firms and firm's products and services through transforming the knowledge into applied form. On the other hand, difficulties can take place because of different incentives that each party has for reaching the required scientific information or industrial data or target.

## **CHAPTER I**

### **1.1 UNIVERSITIES AS A KNOWLEDGE PRODUCER**

Knowledge is a crucial and essential intellectual asset that is provided by universities to the members of the society. Meanwhile, the created and the provided knowledge by the universities has become an essential tool in helping the underdeveloped countries for a long time (e.g. the contribution of Latin America's universities in helping the economy after the independence of Latin America that will explain later in the next chapter).

Knowledge production is a complex process and it requires expertise, skills, tools, techniques and skilled staff for collecting the required information and data through a time( bounded or not, basically depends on the type and the requirements of the research ) and intensive researches in order to collect as accurate information as possible,. This process may undertaken by researchers in universities under academic disciple.

The accumulated and the generated knowledge by one university or many may use in its practical form to solve a specific problem or may use by other universities in researches through exchanging the ideas and the accumulated knowledge in an effort to nourish, flourish, enrich and sustain the knowledge, this process known as knowledge Spill over as well.

Generally, most of the generated knowledge by universities is easy to get, because universities may publish their outcomes and products through academic articles, books, research journals, etc. These products (knowledge transfer tools) may use by other scholars in their researches or it may use by other firms to develop their production,

services or products, firms may find these publications as an interested material. It may include all the required information about explaining the Know-how (skills, expertise, abilities that required to knowing how to achieve something correctly, learning to do something through the accumulated experiences, it is also called learning by doing (Dutton & Thomas, 1985)). Know-why (understanding, theoretically, the implementation of a process, it is also called learning by studying (Dutton & Thomas, 85)) and know-what (kind of knowledge that an individual learns through using the product, mostly seen in computer based systems and technological systems). And providing information through the articles and researches outcomes about how managing intellectual capital of a firm (intellectual capital may include all the knowledge and informational asset of an organisation, that may include all the knowledge, skills, capabilities and expertises and informational trainings on individual level, and all the informational assets of a company that may use in gaining profit) . Moreover, information about how to Improve the management of the social capital (Social capital refers to the social ties and connections among individuals, institutions and norms that may lead to achieve an advantageous network for those whom sharing the sum of the norms through the social interaction) of a firm. <sup>[1]</sup> Understanding these concepts may help the firms in developing new products, services, new medicine, developed medicines, new techniques and new abilities and innovative skills. <sup>[2] [3] [4] [5]</sup>

## **1.2 THE RELATION BETWEEN UNIVERSITY AND INDUSTRY**

Universities and firms have unbreakable relations, as both of the parties had contributed for the development of each other for many decades, separately and jointly through researches collaboration, knowledge and technology transfers that played a considerable role in developing important sectors of industry and science, as seen in medical, ICT and biotechnology, pharmaceutical, electronics collaborative developments.

Although some of the firms might not rate universities as a main information source, universities can be considered as a potential leverage in the development process of the two parties. The two parties are mutual partners in exchanging knowledge in between and they may be seen as complimentary forces for each other, as sometimes they share the process of creating and transferring knowledge between each other in basic terms.

The transferred knowledge between collaborative parties may take many forms; it may be tacit knowledge, as in personal experiences, perceptions, know-how knowledge and any kind of information that cannot be seen or captured, the knowledge on the other hand, can be explicit knowledge, as in written, documented, codified or drawn information, or complex knowledge form ( combination of tacit and explicit knowledge ). The knowledge transfer's between parties via many channels, such as, publications, graduates, undergraduates training, graduates, joint or solo research results, consulting, conferences, mobility of people between the two parties in a permanent or temporary way, patents, mutual research centres, licensing and in some informal ways such as meetings and social networking. With the existing need for strengthening the relationship between the two parties, some of these channels may lead to build a strong knowledge based economy, produce new products to the market, and develop products, techniques, and skills innovatively. Accordingly increasing the openness in these channels and the collaborations, competitiveness starts to boost and sometimes fails because of the complexity of the process and the barriers.

### **1.3 KNOWLEDGE MANAGEMENT AND ITS ROLE IN THE INDUSTRY**

In the recent knowledge based economy, one of the most important criteria that define the value of the firms is their intangible assets, which are the knowledge and the management of the existing knowledge in the organisations. Knowledge management may define as the systematic process of how to create, capture, disseminate exchange and empower knowledge. Managing knowledge plays a vital role in the success and the survival of the organisations. Managing the companies' individual and collective knowledge, meanwhile it ensures how to acquire, store, communicate the knowledge with the correct department or individual of the company accurately and how to generate new knowledge based on the needs of the organisations and how to exchange the knowledge. Many drivers in the external environment may have focused impacts on managing knowledge; such factors as economic, technical and social changes in the environment. Meanwhile, it is possible to mention two additional significant factors affecting KM drivers. The first factor is related with the variables that depend on the science and technology policies in a country and the second factor is the globalization trends that affect a country's related markets. One of the goals of science and technology policies legislations in a country is to improve any country's competitiveness. Currently( recently ), KM may also assume( consider) as a tool for reaching the goals of competitiveness, in which firms that implement and design a successful KM strategies may use KM as a tool for creating more value added product and services. Information and communication technologies are widely used for better KM implementations by the organisations. In this context, organisations are combining human capabilities with firm technological infrastructure, to create in house knowledge, and to transform the produced knowledge into a competitive advantage through applying it in to its organisational entity. This process also includes management of ideas, increasing commitment to the organisation and so on. On the other hand, the produced knowledge may also use for improving relations with the actors in the external environment, customers being as one of the most important one.

KM's contribution and involvement may observe in certain stages. Initially (in the first stage) it starts with the creation of knowledge and acquisition of knowledge from both external and internal environment of the organisation. Regarding the fact that acquiring knowledge is a dynamic process and mostly in the organisational level is achieved according to Nonaka's SECI model (that will be explained in details in the next chapter), the acquired and collected ( from many sources) knowledge is then stored in many systems and databases by different organisational components and units (e.g. strategic business units).

The acquired knowledge is then filtered and stored in different databases to be disseminated to the employees and used for coordinating the departments within the organisation with their needs for information. Moreover, the acquired and communicated knowledge may also used for environmental scanning and positioning purposes.

Positioning or repositioning of an organisation requires an adoption process of the knowledge within the organisation such as the integrating of new technologies, production methods business models with organisational activities. On the other side of the coin for some companies, this adoption process may also require the renewal of human capital for improving knowledge exploitation in the organization.

Briefly, knowledge management for organisations is a multi-dimensional process where human capital, technology and environmental aspects should consider and process in a simultaneous way. In this context, the ultimate goal of the knowledge management may represent as an enhancement, development and improvement tool for the companies' competitive edge. Finally, the application KM strategies in an organisation may also boosts the company's skills and efforts( in individual and organisational level) and channels it to increase productivity by building knowledge innovatively through staff experiences; by forcing the companies to share knowledge and to gain knowledge from others in order to build other beneficial knowledge assets to increase productivity.

## **1.4 INFORMATION TECHNOLOGY'S ROLE AS A FACILITATOR IN KNOWLEDGE DISSEMINATION**

With the rapidly developing and changing technology in the dynamic business environment, the need for innovative tools to manage knowledge has increased tremendously (e.g. using computer based tools, such as applications, portals and software to manage, capture and disseminate knowledge and create new knowledge based on the supported and acquired data). Various methods and tools play an important role in creating a harmony in this process( knowledge transfer) , such as web portals that create a web based communication for transferring knowledge, information that can be transferred and documented online easily with the support of the information technology.

In competitive environments, knowledge may serve for product and service improvement purposes. Accordingly, organisations that who manage their knowledge bases more efficiently may improve their competitive edge, especially when knowledge creation and knowledge dissemination phases are considered as vital stages of Knowledge management of the organisations and need to be implemented in their highest level of efficiency. Consequently, for becoming the society a knowledge base, knowledge turned to become one of the main resources and raw materials that use in every stage of the industry, educational institutions and governmental institutions. on the other hand, Information technology plays an important role in facilitating the usage of the knowledge in the previously mentioned organisational activities within the recent knowledge base competition among the institutions.

As it is obvious that information technology (IT) may play an important role in every aspect of life after the technological development, it plays as a facilitator ( in organisations) for Knowledge management, starting from efficiently managing documents, information, data and knowledge and storing it in the best way that will be easy to access when it is required.

In addition, disseminating, sharing and exchanging knowledge processes become more efficient and accurate since information technology overlapped and interacted with each stage of knowledge management processes, this overlap is consider as the process for exploiting technologies to evaluate their knowledge through using a web-based tools for dealing with one of the most important non tangible assets, Knowledge. <sup>[6]</sup>

A best illustration for IT, KM interference, and the role of IT as a KM facilitator are Web portals. Portals are well designed websites use to disseminate knowledge between collaborating partners, knowledge seekers, within organisations, etc. The main idea of portals (as in collaborative portals) is to create communication and to lead into innovative products, services and ideas through the collaboration by sharing and transferring expertise, knowledge, techniques and methods. Consequently, this process may fill the gap between the theoretical and practical knowledge and collecting as much as possible data and information to create new novel product, services and knowledge.

Web portals become one of most important triggers to develop knowledge dissemination process, some may prefer using portals as one of the suitable solutions to improve and develop the level of coordination among collaborative parties. Portals may fill the gap in the type of used and disseminated knowledge, skills and expertise, through simplifying knowledge dissemination process, which is the basic element for capturing the required useful knowledge from the collaborative party.

One of the best examples of web based university industry collaborative portal is the HUB; the HUB established by the Tufts institute for Biopharmaceutical Partnerships in order to communicate Pharmaceutical Firms and make the university's discoveries and expertise in available for development through the web medium. Tufts University used this medium to ensure interactivity between Tufts University and Pharmaceutical Companies innovatively via creating communication channels among researches and business development collaborations. <sup>[7]</sup>



Considering dissemination and sharing of information of KM stages between parties involved in the process, potential contributions to be made by the related parties may help the renewal of the information in question. With the input-output approach, renewed and enriched knowledge may assume as an explicit resource for the next input session. In this context, the components of the external environment “knowledge environment” have a vital importance. These components can be summarized as the external knowledge database (when consider the presence of digital tools, related databases can be found within the organisation or in open resources accessible to everyone).

The knowledge via portals can be transmitted by using software tools including graphs, modelling and simulation elements and getting prepared for the next use. Latter two components should also be supported with a hardware infrastructure. Hence, during the dissemination and exchange processes the role of IT becomes more obvious when we reconsider the fact that the parties are university and industry.

## CHAPTER II

### 2.1 KNOWLEDGE MANAGEMENT AND HISTORICAL AND THEORETICAL BACKGROUND

#### 2.1.1 Knowledge, Data, Information and Wisdom

In order to understand and comprehend the meaning of knowledge management it needs to focus on the components that define KM in more details. In this context, data and knowledge constitutes two poles of the processes that include information. Data could be a number or a word that has no meaning if it is used by its own. Data could be meaningless if it is not used in a context, sometimes, it is defined as the raw data that has no significance or reference, it stands for nothing by its own, yet, a collection of data can be useful to form information and knowledge when it related through a context. One of the definitions of the data is the raw facts gathered and collected from business transactions and activities (Parikh, 2001). Or unprocessed facts, with no concern of any value and purpose ( Alryalat and ALHawari, 2008).<sup>[8] [9]</sup>

Information is a collection of data categorized, reviewed and related with each other, the relation that has a context explains a situation and it sands or forms something, and information is the result of interpreting and translating a collection of data to support in building something bigger that is knowledge. It can Represented as categorized, classified, demonstrated and scrutinized data (Kahn and Adams, 2000). Or as” Processed data-added value to determine purpose” ( ALryalat and ALHawari,2008). According to Oxford dictionary, Knowledge is defined as the “facts, information, and the overall skills that acquired via experience or education and the theoretical or practical understanding of a subject”.<sup>[10] [8]</sup>

Knowledge means power that is generated from combining experiences, judgement with information obtained from people's experiences (Kidwell, et al, 2000). <sup>[11]</sup> It has to be generated dynamically, linked to people's experiences, created by combining and merging related, categorized and classified information, considered one of the main raw materials that is used by organisations in each level of the organisation and in each process to survive.

To sum up, data mainly includes facts, observations and messages and used as a primary element for producing knowledge. When in depth information is required, it can also be assumed that the data can be observed in the raw form. Data can also be used to set up the content in human brain, where, brain later creates the knowledge by using the organized information. Knowledge appears as a result of data processing and transforming to information by human brain, where, some researchers also define this process as experience, in other words, knowledge is the result of what human brain do by using acquired data

There can also be timely differences between data and knowledge. With the elapsed time, human brain generally keeps the data with its original form, where, knowledge may be subject to change. Moreover, knowledge can also be subject to change or modification as a result of interaction by external resources. In this form, it can be assumed that data has mostly a static whereas knowledge has mostly a dynamic identity. With input/output approach, data can be considered as the input and knowledge as the output. In this token, it can be contemplated that the "filtering mechanism" that has human brain affects the quality of the produced knowledge. Accordingly, the ultimate peak of Data, Information and Knowledge hierarchy is the Wisdom, after understanding, the patterns of how knowledge that generated or emanated, the role of an individual starts here, to be ready to deal with catastrophic situations spontaneously in organisations based on the correct perception for the situation.

The wisdom comes after an intensive digestion and understating for the concepts and the practical scenarios of the collected knowledge, information and data starting with the personal expertise that is known as know-how, know- what and ending with know-why that is the comes after learning and studying each stage of the knowing process and translating it in to actions. Knowledge can be categorized in to two types: tacit knowledge and explicit knowledge, Tacit knowledge is more personal heaped up through personal experience , study and developed through interaction that includes socialization and conversation, although it is hard to take a specific context or articulated in a specific form, as a result tacit knowledge becomes difficult to transmit.( NONAKA ,K2) <sup>[12][13]</sup>

Explicit knowledge is the knowledge that expressed in more formal and systematic way, it can be stored and shared and transmitted easily, explicit knowledge is the converted form of tacit knowledge in to reachable, useable articulated and formulated explicit context.(NONAKA,K2).<sup>[12][13]</sup>

Organisations need to manage their valuable intangible assets, knowledge( in its 2 forms), by organising, documenting, enriching, transferring, sharing and producing knowledge through set of processes performed continuously in every stage of the organisation.

As it is obvious that knowledge is the most valuable intangible asset for organisations because of its usage in each stage and level of organisations' activities , so organisations need to collect required information , maintain, reserve , store , enrich, create new knowledge, filter and make it available for everyone in the organisation through set of process which is known as Knowledge management.

### **2.1.2 Knowledge Management**

Knowledge management is a broad term, used of the notion that supports the organisation to allocate the capabilities and targets of the companies to be efficacious in what they do. By supporting them with the tools and methods to collect knowledge and required information and data to create knowledge from the employees, customers and partners, modify, transfer, codify and share the knowledge.(Orlov, 2006) <sup>[14]</sup>

On the other hand, Nonaka & Takeuchi defined Knowledge management as the capabilities of organisations to create new knowledge. and how to disseminate the knowledge via the organization and embody the knowledge in the systems of the organisations as well as the products and services of the organisations (Nonaka & Takeuchi, 1995) <sup>[15]</sup>

Knowledge management has defined in many ways by many authors, organisations and scientists differently, but on the other hand, all the ends and targets match, that is how to manage the vital knowledge efficiently, how to transform the personal knowledge properly and how to make it available for the survival and success of the organisation.

In the early 1970s, with starting of the globalization, companies started to face transformations and economic and technological changes, these changes showed the importance of knowledge as a valuable asset for organisations. Knowledge management has started its baby steps and early developed in the beginnings of 1970, because of the work of academics and practitioners, such as, Peter Ducker and Paul Strassman' publications on the accelerating growth of Knowledge, information importance as one of the valuable assets in business world, others such as Peter Senge, concentrated on organisations and the learning process.

Peter Ducker also in 1960s mentioned and invented the term “knowledge worker”, this term refers to all the workers who work at tasks for developing and using information in their work, which is an important factor for the success of an organisation <sup>[16]</sup>

In 1980s, the importance of knowledge and information as a competitive advantage for the companies become an unarguable fact and the publications started to increase related with this topic, also new concepts such as knowledge acquisition ,knowledge engineering, the increasing role of using computer based systems in managing knowledge and new humongous numbers or articles appeared and published in journals. In 1990s, the support of universities' conferences and academics' publications for the role of Knowledge management to become part of the organisation's foundation tremendously increased, started with publishing the article "brain storming" in fortune magazine by Tom Stewart in 1991, followed by Nonaka and Takeuchi study on how knowledge created in 1995 and others. It became an international matter and important desirable solution and source for increasing revenue and to become the competitive edge. <sup>[15][16]</sup>

The development of Knowledge management involves certain stages that can call "generations". Knowledge management developed and reached its early mature stage after applying its concept in applications by the companies starting with the first generation that focused on technology and collecting documented knowledge by using it and creating the Chief knowledge managers titles in the big companies. The second generation that concentrated on people and how to gather, codify the gathered information from managers and the other stakeholders, retain and transfer the knowledge and using the Nonaka techniques in creating knowledge that is known as SECI process for knowledge ( both tacit knowledge and explicit knowledge ) , the terms stands for socializing , externalizing, combination and internationalization. <sup>[17]</sup>

The third generation (post Nonaka) that deals with people, technology, process, and understanding the work environment in a way to increase job productivity, with regarding to the environment were knowledge enriched and developed. <sup>[17][18]</sup>

### **2.1.2.1 Knowledge Management and Nonaka & Takeuchi's Theory**

Some of major theories that appeared and become the centre on studying Knowledge management are Nonaka and Takeuchi Spiral model. The Nonaka and Takeuchi Spiral model appeared in 1995 after an intensive study by the two scientists on the success of the Japanese organisations.

They focused on studying the cognitive forms of knowledge ( tacit and explicit ) and the required stages that knowledge has to get through to change its form in the three different levels ( individual, group, organisation) and the required harmony to create knowledge, they found that this success often emanates from non-objective insights.

They emphasized that the knowledge creation starts with the smallest entity of the organisation, individual, always a brilliant idea that leads to innovation or successful trends comes from an individual's insights or experience, making personal experience available in the organisation is the essence of knowledge management.

In order to create a new, productive and novel knowledge, the collected data, information and mimics, insights and personal experience should converted from its current shape or form by getting through SECI modes in the individual level.( SECI extends for Socialization, Externalization, Combination and Internalization.)

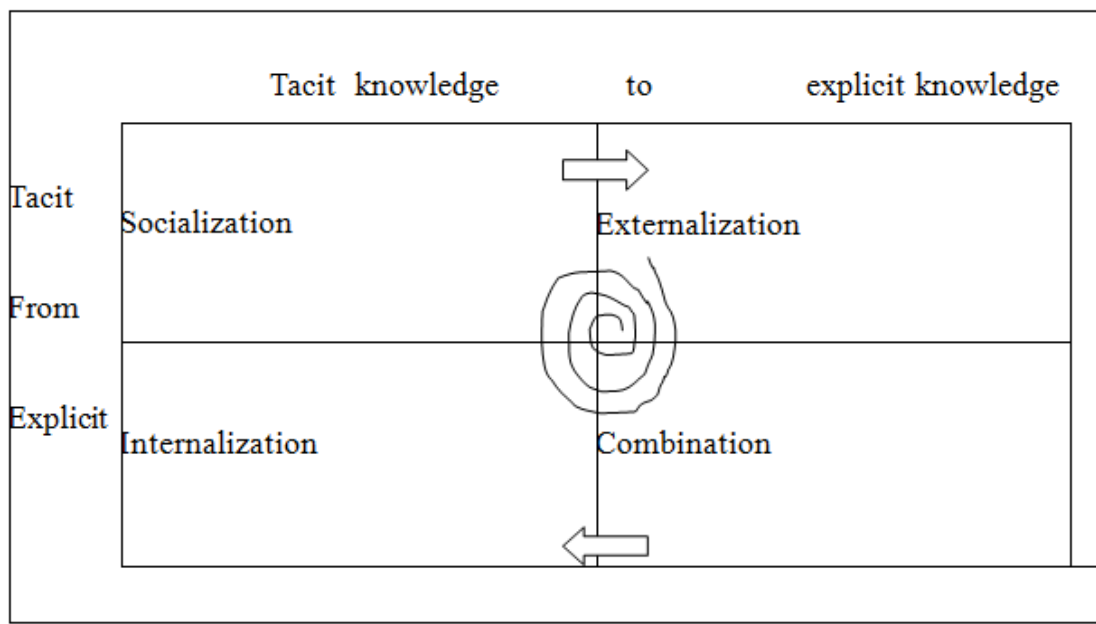
Socialization ,(tacit to tacit), in this process the knowledge will be shared interactively through the regular social channels starting from fact to face meetings ending with other types of social interaction to simplify the knowledge exchanging process

Externalization, process of transforming tacit knowledge to explicit knowledge, in this process the previous tacit knowledge that was transformed will be articulated, written and documented as notes or hypotheses so it can be easily transferred through the organisation.

Combination , (explicit- to-explicit), is the third stage of the knowledge conversion process of Nonaka and Takeuchi theory , in this stage the gathered explicit knowledge that was gathered in the previous stages will be combined, analysed, synthesised and documented in more useful comprehensive form and ready to used by the organisation.

Internalization, (explicit to tacit), after using the overall gather explicit knowledge in the last stage on Nonaka Takeuchi model, the overall individuals' behaviours and experiences will be recorded as new tacit knowledge combined with the previous explicit knowledge to understand and analysis the changes differently.

The overall knowledge creation and conversion processes should achieve spirally, dynamically, systematically, and not sequentially in order to achieve the best flow and sharing of the gather knowledge by the stakeholders.



**Figure 1:** Dynamic Spiral (SECI) of Nonaka (Source: Nonaka and Takeuchi, 1995, p.62) <sup>[15]</sup>



### **2.1.2.2 Schools of Knowledge Management**

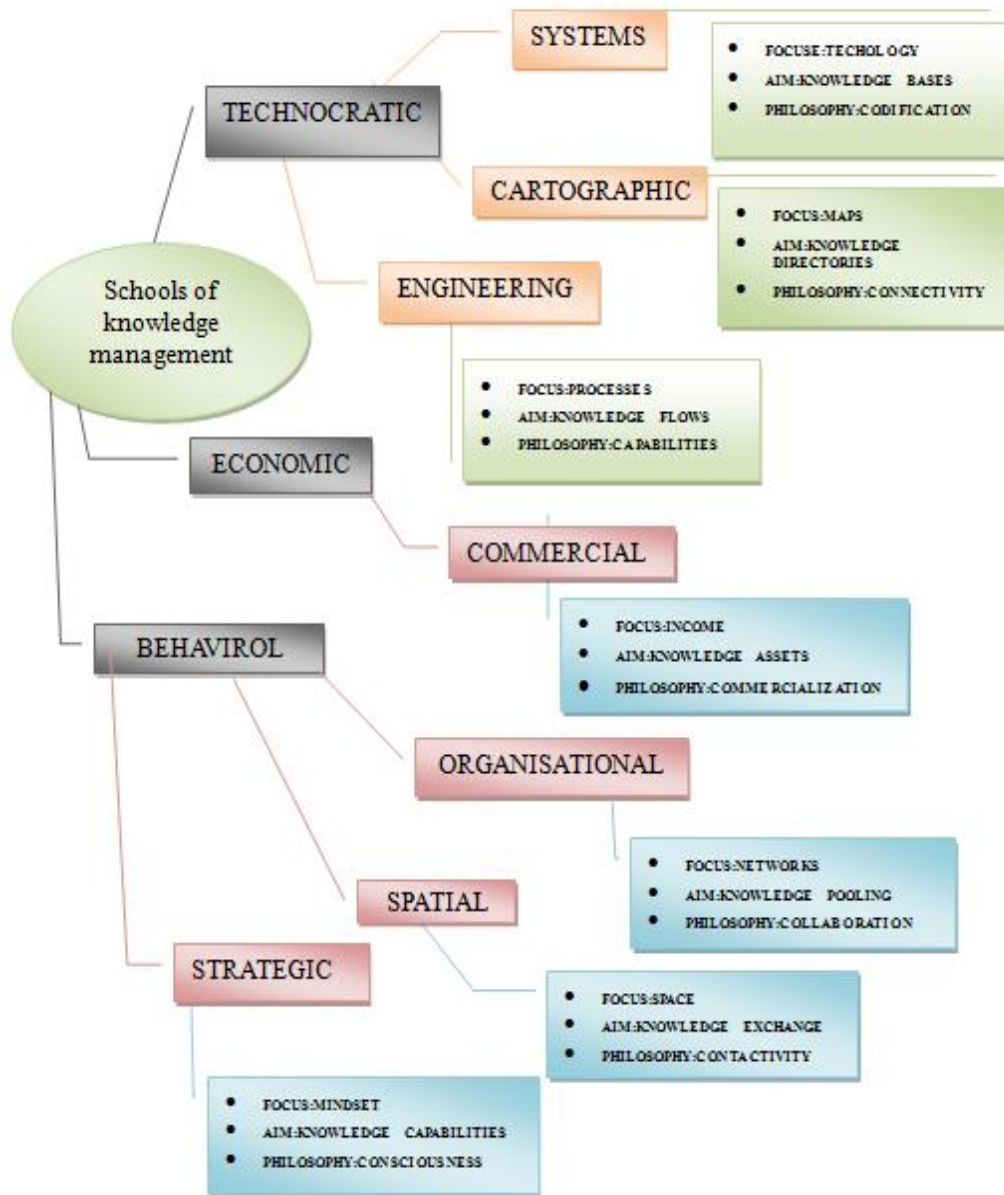
With the different perspectives that Knowledge management has and different directions that it serves and performs effectively, based on MICHAEL EARL, Professor of Information Management, summarized the schools of knowledge management (figure 2) based on its direction, focus, aim and the critical success factors that effects on knowledge and the scope that it serves.

Generally, EARL divided Knowledge management in to three groups that includes other schools within, Technocratic, Economic and Behavioural.

The first group, Technocratic, includes three schools which are system school, cartographic school and engineering school, the group is based on how to manage Knowledge, information and how to manage it with technologies and how to make knowledge sharable and accessible for those who seeks it.

The second group, Economic, includes only the Commercial school based on how to use knowledge, the most valuable intellectual capital, commercially efficiently, by using it or marketing it profitably.

The third group, Behavioural, includes three schools, Organizational school, Spatial school and Strategic school, these schools mostly deals with the behavioural aspects of knowledge, managers and employees in creating, transferring and sharing the knowledge that will used by others as a resources.<sup>[19]</sup>



**Figure 2:** MICHAEL EARL's Knowledge Management Schools Summarization

### 2.1.3 Knowledge Management Defined In Stages

Creating a successful basic knowledge management system requires as a beginning a dynamic and a cyclical process to accumulate and collect data, information and knowledge to pave the road for creating the ultimate position of employees which is wisdom, and then it requires refining , documenting ,storing ,transferring and disseminating the knowledge within and out of the organisation. <sup>[17]</sup>

After establishing a solid framework for knowledge management system in an organisation, general steps should take place to ensure for creating knowledge awareness in the organisation and the prosperity of knowledge existing for the concerned parties. <sup>[17]</sup>

The general framework of knowledge management includes three main processes that work in a cyclical pattern, Knowledge creation, knowledge integration and knowledge dissemination, and all these processes all include seven stages, as Identifying knowledge, acquiring knowledge, storing knowledge, developing knowledge, transferring and disseminating knowledge, preparing knowledge for usage and preserving knowledge.

The formation and the design of the three main processes, when and where implementing the seven stages within these process, and how many times we do need to apply these stages and where should the seven stages should implement varies accordingly with:

- the design of the organisation
- Complexity degree of the organisation
- The infrastructure of the organisation
- Organisational culture
- Environmental requirements
- Identification of the internal and external process required for collecting knowledge

The seven stages are:

- Identifying knowledge: the first step and the critical process in knowledge management, the important part in this step is to examine the existent information and to check if it is knowledge or not, is it relevant or not, how to extract the knowledge from individual's expertise, organisational expertise and core competence and other resources.

This stage is important and crucial for organisations, where organisations become able to differentiate if the knowledge is tacit, explicit, multi-disciplinary, valuable or relevant for the organisation, complimentary for the existing knowledge or the organisational functions.

- Knowledge acquisition: In this stage, the important step is specifying and acquiring the required knowledge for developing and improving organisations' expertise (organisational or individual) needed for the production, marketing and other needed processes achieved through production, and the missing organisational capabilities from external sources to reflect it in to the organisational expertise in both individual and collective level.

External sources could be the information of stakeholders, other companies' previous experiences, production techniques, marketing techniques, patents (exclusive rights given to the person who is responsible of inventing a new product, new technique, new device or new knowledge), new ideas mentioned for example in an article that could lead into innovative products, database systems or any other models or techniques.

- Knowledge Storage: is the process of coding, storing, indexing and classifying the acquired knowledge in a special repository and prepare it to be ready to use by the organisation's members in the further processes by fetching the required information by using special computer based programs and applications and make it part of the production process. Repositories generally are computerized central warehouses, where all the data, information and resources are stored, accessed and fetched to use, sometimes it consist of many databases and searching engine.

- Knowledge development: is the process of developing and auditing the acquired knowledge and producing new knowledge by merging it with the existing expertise ( could be any organisational routine ,for example, individuals expertise in producing or marketing a product) to increase the creativity of the individuals or to use it in managerial decisions processes or analysis in each level.
- Knowledge distribution or dissemination: is an important fundamental process of knowledge management, in this vital step, the correct information or knowledge should disseminate and send to the correct party that requires the information accurately and sufficiently within the organisation. It is a matter of creating linkage between the parties and sharing the knowledge among them to achieve the success of using the required information the organisational process. <sup>[20][21]</sup>
- Knowledge usage: in this stage of knowledge management the gathered ,stored, processed and disseminated knowledge will apply and use effectively, beneficially and identically with the organisational functions and processes, ensuring the best and actual use of extracted ( such as personal experiences ) and collected knowledge( from the stake holders ) on the interest of the organisation is main goal of this stage.  
For example, knowledge usage and application in an actual way can seen in the through the decision making and production process in organisations , such as reviewing and using the collected and analysed information that is stored in special database systems to help the mangers in decision making or improving production.
- Knowledge preservation: the preservation of the collected and processed knowledge is important for organisations, efficient steps will decide by the organisation in this stage to sustain and keep the knowledge up to date such as, what should be stored, deleted, processed, developed and prepared to use in the future.

These stages are important for the survival of the organisations as long as the knowledge. Since knowledge is an important valuable asset that stored in special database systems, administrated through special computer base applications and knowledge workers, and used to help the members within the organisation to facilitate using the required information, which leads to increasing the productivity and innovativeness of the organisations. It is known that knowledge is the best source for power in industry, education, life, etc, so the produced knowledge should transfer efficiently and beneficially form the transmitter, who is the knowledge producer, to the receiver, who is the knowledge user. Knowledge dissemination, takes place between separate parties' members; it could be individuals within the organisation or in different organisations, between organisations, other parties such as universities and other stakeholder.

It was mentioned before the importance of the universities and its role in knowledge production for decades, especially theoretical and scientific knowledge, which contributed in the development and reforming industry and increasing the competitive edge for both parties. As a result, for the rapid technological development and the usage of computer-based and web-based channels for disseminating knowledge in organisations and universities, an intensive need for developing and selecting efficient channels to improve the dissemination process emerged, especially in collaborations to perform the competitive edge for the collaborative parties. Web-based knowledge dissemination channel provides tools to simplify the searching process through browsing and searching topics and information based on keywords through searching engines, websites provide tools to download the required document that contains all the necessary information. Best illustration for this channel, is digital library (e-library) that used by the universities to disseminate and transfer knowledge, for example, hathitrust, which is a digital library formed by the collaboration and the partnership of more than sixty research institutions and universities to make their productions and publications available for their users according to special contracts and laws.<sup>[20][21][22]</sup> <http://www.hathitrust.org/home>

#### **2.1.4 The Role of Knowledge**

Knowledge dissemination is the process of selecting the required explicit information and knowledge from the repository (the data base system or the data warehouse) of the organisation and sending it to the targeted audience effectively.

Generally, information is stored in a centralized repository in the organisation after been acquired, refined, developed and ready to share with members of the organisation.

After collecting, capturing the information (tacit and explicit knowledge), creating (converting the tacit knowledge to explicit knowledge), refining the collected knowledge, selecting the useful one for the organisational process and for the employees, storing the information in a special database in the organisation, here comes the role of disseminating knowledge, achieving a successful knowledge transfer and making information available.

The flow of information from one point in to another in the organisation must achieve based on special contexts designed by the organisation, the reason of contexts is to simplify storing, sharing and retrieving information processes and to define the flow and the directions of the information transmission.

The dissemination process should implement according to special models and techniques designed and achieved actively based on the requirements of the organisation, such as comprehensiveness and educational degree of their employees, the dissemination process requires from the management to rehabilitate, educate their employees to use the dissemination channels efficiently and effectively (especially when the organisation uses a web-based channel). As a result, this process has an influential impact on the survival of the organisations and it should implement according to special models otherwise it will lead the organisation to retrieve a fatal feedbacks. <sup>[20][21]</sup>

The concept of knowledge dissemination has evolved because of the technological development and the demands for the necessity of developing the dissemination channels to acclimate with the current technological development cycle, for many decades before the rapid technological development, training courses , printed sheets, workshops and classroom were and still one of the effective channels used to disseminate knowledge in organisations.

Additionally, the informational and computational infrastructure developed proportionally with the rapid technological development, starting with used methods for collecting, extracting, sharing and transferring digitalized information among individuals, groups and organisations, information and communication technologies, and ending with used methods for demonstrating digitalized information.

As a result, organisations realized using computer-based channels increase the productivity and innovativeness of the organisational processes, meanwhile, their concern on developing and utilizing the usage of collected data in applications channelled the organisations to use Data base management systems and Portals for storing, managing and using data (the organisations' vital asset) on most optimized and applied form. [22][23][24]

[25] [26] [27]



#### **2.1.4.1 Knowledge Dissemination Channels**

Selecting channels for transferring and disseminating knowledge will diverse and change accordingly and selectively with the awareness degree of the employees, the educational level of the employees within the organisation, the targeted audience, the type of knowledge that is required to disseminate and the knowledge complexity that needed to demonstrate.

the financial capabilities and the size of the organisations is another factor for the organisations to choose the proper channel for disseminating knowledge and achieving knowledge flow efficiently to the targeted party effectively, the factors that mentioned above has a positive correlation with the channels selection process and the knowledge dissemination success.

The channels may be non-computer- based, which is widely used and cannot be diminished because of its effectiveness , such as articles, printed researches, worksheets, journals, academic studies, books, trainings, workshops, formal and informal meetings and interviews with people with expertise, monitor and feedback on the ongoing processes of the organisation and conferences and seminars.

On the other hand, selected channel can be computer-based channel, such as

- e-mails, e-notes and e-libraries.
- Special intranet designed by the organisation to achieve a successful communication.
- Publications, academic researches, studies, and unstructured data stored in specialized database (knowledge respiratory).
- Collaborating support systems: these systems designed to simplify using integrated information via the communication technologies, also, simplifies interaction process among individuals via special techniques. (ALAVI &leinder, 2001).
- Internet services.

- Electronic Bulletin Board and Blogs: electronic blogs used by the organisations to demonstrate the posted frequently asked question (FAQ) by the employees and the answers by experts in that topic. ( Dixon,2000). [28]
- Groupware: is special software for intellectual group activities such as information sharing via one to one collaborations and virtual and electronic meetings. ( laudon & laudon, 2004). [29]
- Video conferences.
- Decision making support systems: special systems designed to use unstructured and structured data and information through analytical programs in decision-making process (Alavi & leinder, 2001). [30]
- Knowledge disseminating portals: also known as enterprise or cooperate portals, designed to simplify communication and transfer information among the individuals in the organisations.
- Portals are one of the major tools that used by organisations to simplify the capturing, storing and disseminating processes within the organisation; where these portals are designed according to the demands of the organisations and its users. Some of the main functions that are achieved by these portals as follow :
  - ❖ Facilitating the communication among employees
  - ❖ Providing the employees with the required relevant information and answers for their questions
  - ❖ Supporting in decision-making by simplifying fetching the related information
  - ❖ Providing online services
  - ❖ Facilitating the search through the information stored in different formats
  - ❖ Providing instant messages services through the portal.

The portals support a single point access to the internet (Deltor 2000, alavi)<sup>[31] [32] [33] [34] [35] [17] [25] [36]</sup>

#### **2.1.4.2 The Contribution of the Dissemination Systems on the Organisations (the HP example)**

Portals designed, based on the requirements of the organisations, to manage on the acquired data and disseminate it in order to get the optimal output, inputs can be any unstructured data that will be useful for the success of organisation in its processes.

For example, inputs for a company's knowledge portals could be tacit knowledge or explicit knowledge, such as customer's desires, expectations, information about the product, information about required techniques in the production, and the output could be answers for questions such as, is the customers' expectations fulfilled?, and is the product produced optimally?, and many others.

as an example, Hewlett-Packard (hp) company, which specialized in high technology, concerned with how to achieve a successful flow of information among their employees and staff members, @hp, is a portal designed and established to use by the employees in the company, more than 90.000 users are members in the portal and they use it as interface. The portal in question is supported by applications and software such as Lotus Notes (a supportive application designed by IBM company, helps the employees to find the information that they need, the application is easy to use, provide the business information and applications required to finish the business, interface for employees' discussions by using real time instant messaging). HP portal is also supported with Electronic Sales Partner system (ESP) (a special intranet system designed by HP in 1995, supports a direct connection with repository contains thousands of documents accessible through special searching engine such as Netscape Navigator) to support in selling process. The best way for administrating and succeeding the information flow process by using a portal is to translate and encode all the information and data in to extensible markup language (XML) according to special rules, contexts and routines<sup>[31] [37] [34] [35] [17]</sup>

### **2.1.5 Convergence between Knowledge Exchange and Knowledge Dissemination**

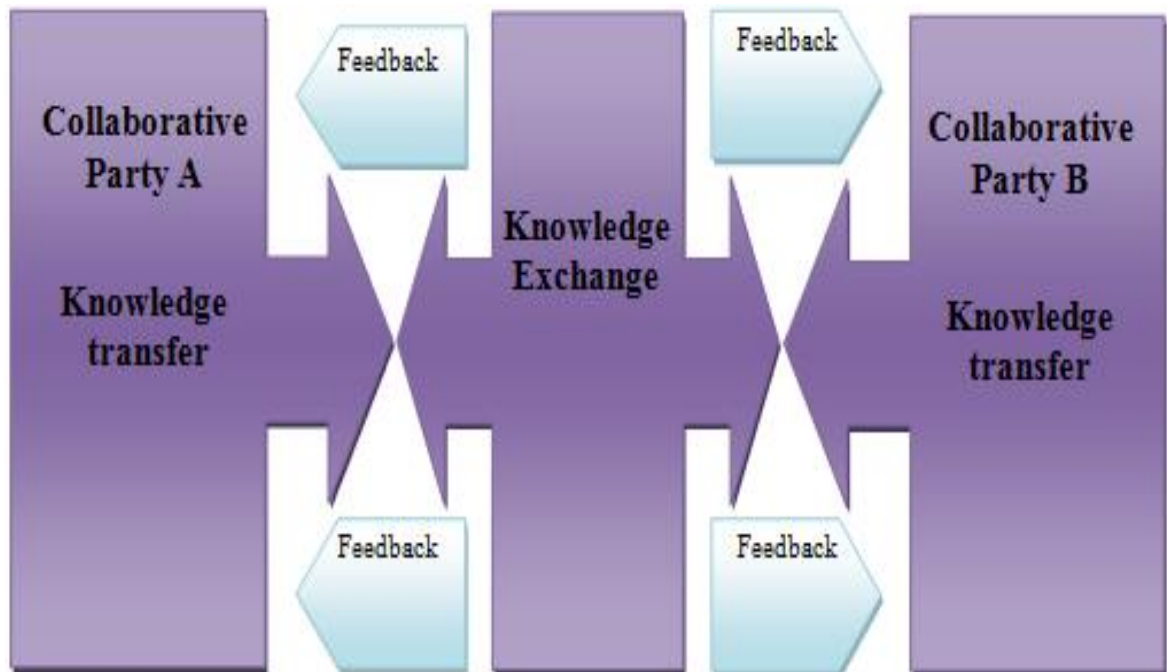
Knowledge dissemination and knowledge exchange are vital, critical, coherent, complementary and overlapping components for achieving a successful knowledge transfer, within the organisation, and within the collaborating parties. As it is mentioned previously, an effective knowledge dissemination process requires outlining the targeted audience, specifying and selecting disseminating channels, evaluating the impacts of the channels and the transferred information on the receivers, and planning each process with analysing the feedback, planning these steps is a critical matter for the organisation. Wrong decisions and plans could lead to a fatal failure decisions making. <sup>[38]</sup>

Knowledge exchange is a dynamic process of transferring knowledge from one party to another and creating a constructive, successful communication and linkage among the collaborative parties and the knowledge users, Knowledge exchange mostly takes place when there is a matter that needs collaborative solutions in decision-making and interaction among the parties. For example, when a company might needs to develop its research and development process through consulting with an educational research centres that belongs to any university, for sure the company will get the consulting services on the required topic from these research centres.

The same goes on with universities, if assumed that the university members are up to study the market situation, the required information might be collected from companies that are in a direct interaction with the market situations. Another example of knowledge exchange can witnessed in joint research that takes place between two companies or a company and university on solving a specific problem, by sharing the accumulated knowledge of the two parties and it will involve giving feedbacks to each other about the progress of the researching through the collaboration.

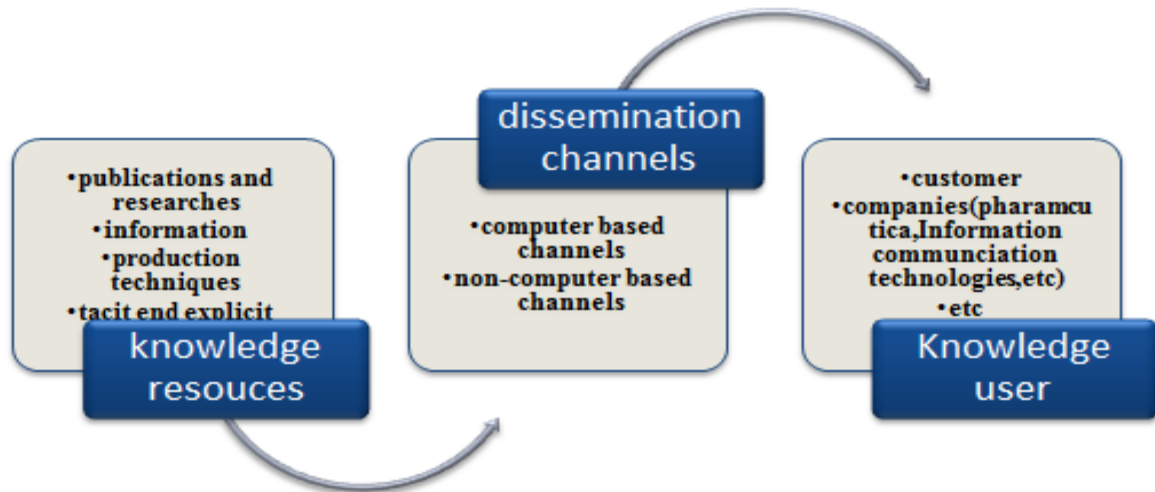
Knowledge exchange also known as integrated knowledge translation, unlike the knowledge dissemination process, knowledge exchange is a bidirectional process of

information flow. As shown in Figure 3, Knowledge exchange lead to a successful mutual learning, ensuring the flow of the information between the knowledge users and the knowledge researcher and creators. [38] [39] [40]



**Figure 3:** Knowledge Exchange

Disseminating information implicitly applied in the exchange process to achieve a successful information transfer, as it is obvious, through information dissemination, the flow of information takes only one direction (linearly) as shown in figure 4, accordingly the process could be productive or passive, based on the recipients and the used channels.



**Figure 4:** The Flow of Information in Dissemination Process

Exchanging information is a more complex process, mainly seen when there is a collaboration to solve a matter, the process includes:

- disseminating information
- Getting continuous feedback and interactive engagement between the collaborative parties
- Using information productively
- Generating new tacit and explicit knowledge through the feedback and information identification and inspection processes and documenting it.

The potential collaborative parties that may participate in knowledge exchange and knowledge dissemination could be:

- Universities(academies)
- Governmental institutions
- organisations
- Hospitals
- Nongovernmental organisations (NGOs)
- Collaborating with experts in special projects

The collaboration could include two, three or more parties; the flow of the information that will disseminate through the dissemination channels (computer based and non-computer based) in the knowledge exchange process could be in two directions or more based on the number of the participants of the collaborative process as shown in figure 5.

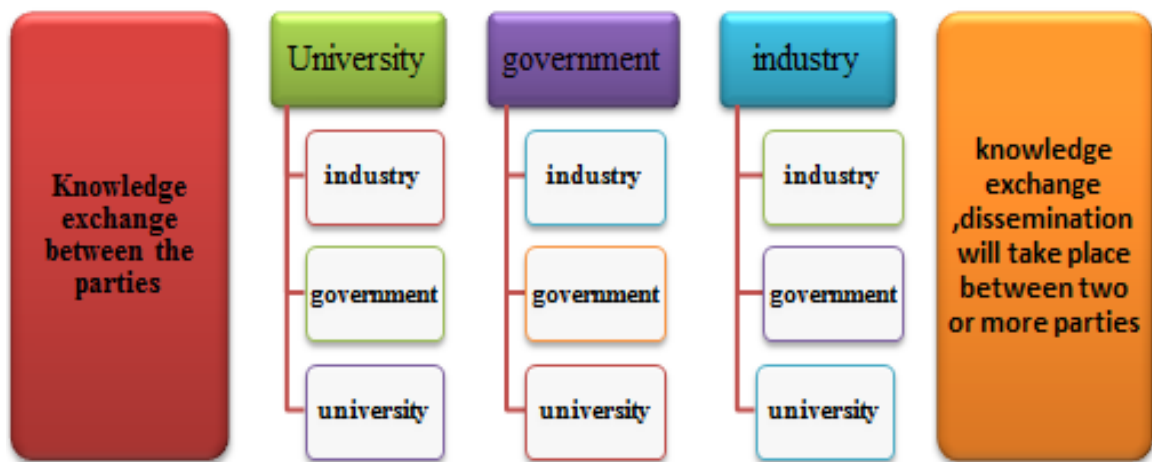


Figure 5: Type of Collaborations [41] [42]

## **2.2 UNIVERSITIES AS SCIENTIFIC AND THEORETICAL KNOWLEDGE PRODUCERS.**

For many centuries, universities are known as one of the main actors in producing, documenting and developing theoretical knowledge. Long before classifying science, this role has become more substantial since economy transformed in to knowledge base; knowledge became a crucial capital for industry and government.

Consequently, universities role shaped as one of the important producers of theoretical and scientific knowledge and as one of the main institutions to help the countries in developing economies, providing competitive advantage to industry, preparing and training human capital capable of handling theoretical knowledge in its applied form .

Universities have a role in building a solid base for the society members to handle knowledge. How individuals use Knowledge when they need answers to solve their problems. How individuals start researching to solve any problem through the produced knowledge by the universities.

With the universities capabilities to produce knowledge and information and their ability to affect by the social, economic and governmental aspects of a country, some universities played a historic role in modernizing and developing countries and its economies. For example, after the independency of Latin America from Spain, national universities emerged, these universities contributed in building and educating the nation, the contribution was ensuring the provision and the availability of the notions and the ideas required in the development process of economy in the content after the independency. <sup>[43]</sup> Universities produce scientific and theoretical knowledge on a continuous bases starting with collecting information and combining the related information with one another, understanding the relation of the collected information with each other and creating a special context specified by the researcher and developing it.



Mainly knowledge produced in the university via the Research and Development (R&D) process implemented by the academics, it takes sometimes many years to produce productive and useful information and enhancing people to be capable of using this knowledge.

Knowledge can also be produced through observing, collecting and analysing information ,and can be exhibited it in seminars, conferences, workshops, training courses, observing Know-what and know-how processes and expertises of individuals by using special techniques such as ( in-depth interviews ) to articulate within tacit knowledge ,or applying to get a consulting services from a specialized party such as a researching institute.

Information also can be observed from filed and lab researches. For example, academic outputs ( such as publication and articles) are one of the important products of universities transferred from universities to researchers( in university, in research institutions), students, sector professionals, academics, etc, this step followed by collecting and analysing the feedbacks and reviews on these publication or other products not only to generate new knowledge but also to improve publication. Hence, knowledge exchange is important in two aspects: gathering data for creation of knowledge and improving the existing knowledge. Accordingly, producing knowledge and transferring knowledge are cyclic and intertwined processes.

SECI (socializing, externalising, combining and internalizing) spiral approach of Nonaka is one of the important models used through knowledge production ( shown in figure 1 and figure 6), widely observed in the collaborations of the universities with other parties, group interaction, or by the academicians when they are up to start a research on a special topic. Hence, collecting, analysing, discussing and observing the impacts of the information become easier. The produced knowledge will known as academic knowledge, that is flawless based on realistic and scientific rules, data and information and should be justified (Knorr 1999).<sup>[44]</sup>



**Figure 6:** Cyclic Relation of Knowledge Production in University

Universities does not produce academic knowledge arbitrarily, decision to produce knowledge arise after defining the stakeholders and evaluating their need for new information, universities will evaluate the social and the industrial needs( external factors) for new knowledge, techniques, developed skills and capabilities. On the other hand, internal factors, such as the competitive nature of the universities for developing the quality of the given services, improving the prestige of the university and the international statues of the universities make universities produce new, effective and novel knowledge.

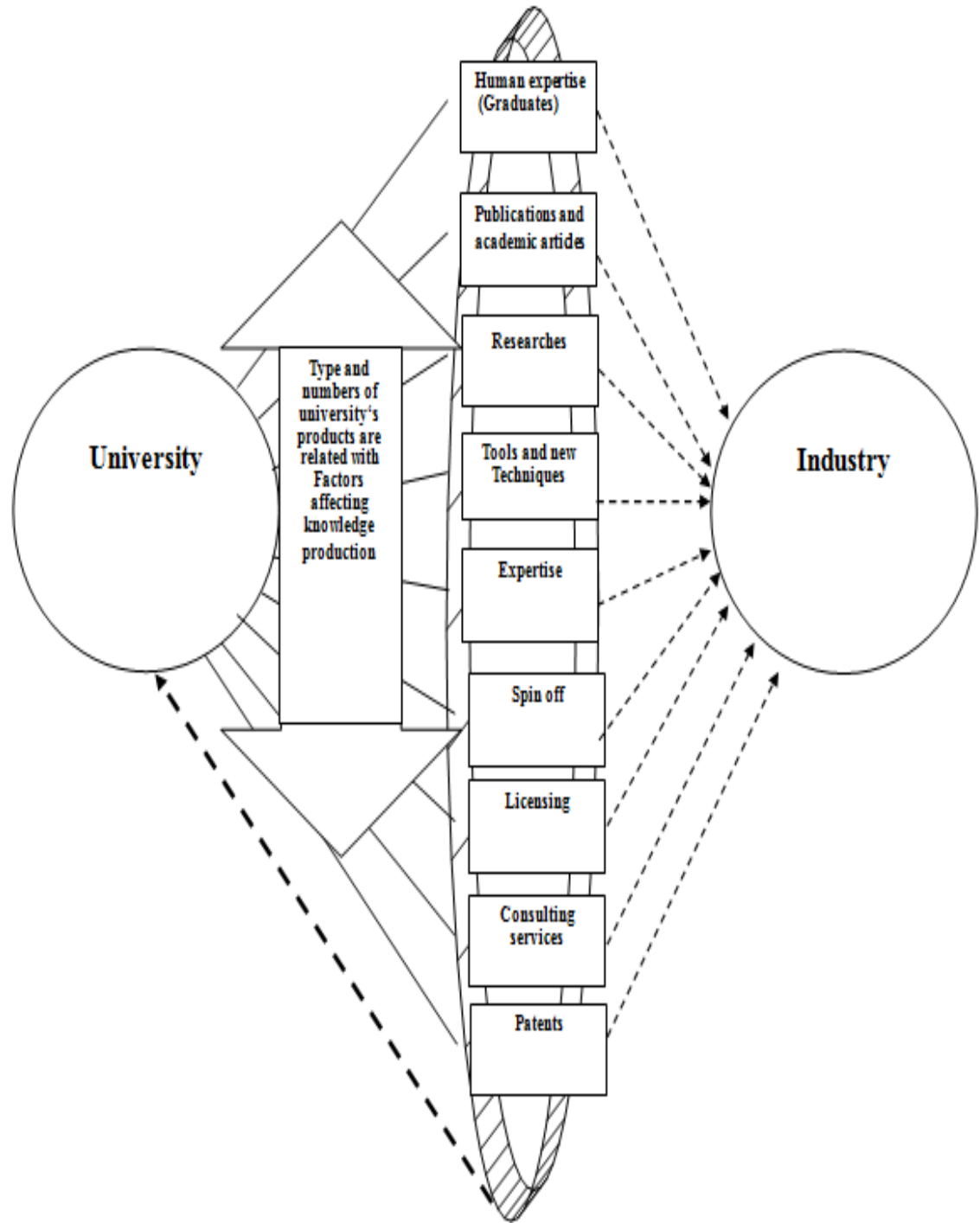
[45] [46]

As we mentioned before, universities have a significant role in producing knowledge via Research and development process, is not an easy process, sometimes it takes many years to produce knowledge through the R&D process, and because of the need for the technological development, knowledge become a valuable asset and source for competitive advantage for universities, industry, individuals and government.

Accordingly, with the current rapid development, and the need for adequate and beneficial new knowledge, universities began to increase their R&D processes to produce knowledge. Other parties such as organisations began to provide the funding to start researching (mostly observed when the research is industry based); developing on the required information or solutions by the parties, and collaboration emerged with industry, government, or both to produce knowledge when there is a necessity for it.

Many factors influence the knowledge production process by the universities; magnify the capabilities of the universities to create linkage with the external environment such as organisations and government, and to increase the two parties' chances to produce innovative technologies and products, factors such as:

- interaction level with industry members and governmental institutions
- time constraints to produce new knowledge
- universities' infrastructure to begin a research and produce knowledge based on industrial need resulted from the collaboration needs
- adequate funding to proceed the research, and how to find the adequate funding and how attract funders( government, industry or individuals )
- the capabilities and expertise level of the academics



**Figure 7:** University's Products

## **2.3 INDUSTRIES AS KNOWLEDGE PRODUCERS (R&D) AND USERS**

As a result for the transformation and the evolution of industry in the last decades in to knowledge based industry (according to the standard industrial classification code (SIC) when industry becomes technology and knowledge centric industry) , knowledge emerged to become a necessity , an important tool and asset for the development and the success of the industry members.

Industry related Knowledge helps in the enhancement of the firms' capabilities effectively and to cope with effects of some environmental factors, such as, the rapid developing of the technology, therefore, the acquisition of new knowledge and using it efficiently becomes an important resource and reason in accelerating and succeeding in the competition between the members of the industry nowadays.

Generally, the required knowledge, information , data, production techniques and new skills for handling the progress of the firms' production activities or service and product marketing activities in every stage of the firms either is collected and captured externally or produced internally, and by externally, it means all the collected data and information from articles, academic and non-academic publications, surveys ,etc. Internally produced knowledge or in-house produced knowledge, is all the information and data that produced anywhere in the organisation or organisational activities.

For example, through the feedbacks that company members get from a customer, or by the legal affairs of the company, through a meeting, through the legal affairs of the company, from the tacit and the explicit knowledge that collected from employees, etc.

Company also can conduct knowledge in the Research and development (R&D) processes in the industry, sometimes producing knowledge by the R&D ( based on the sector and the company size) is expensive and may cost too much as seen the pharmaceuticals a, biotechnological and ICT companies .

The knowledge that produced by companies via the R&D varies according to the sector, it could be in terms of medicine, drug, or medical discoveries (as in pharmaceutical companies), patents or new innovative production technologies (as in chemical and electronically companies), or consulting services (consulting companies and agencies), new applications or software (as in information and communication technology companies). Knowledge production can be clearly observed in ICT sector through huge number of new software and applications that produced continuously as seen by the applications of Microsoft and Oracle.

The result deducted from the R&D activities maybe reuse by the same company that was in the first position responsible of producing the knowledge (the knowledge producer), also, (when it is needed) it may use by other firms in the industry to improve their production , their marketing operation, or it may use by the university through their R&D processes , and by the government, as in figure 7.

Accordingly, some companies prefer (based on the customers' demands or because of the governmental pressures to develop industrial R&D activities) developing the R&D departments and increasing the Research and development processes' intensity of the companies ;Since it is one of the important actions that must the company take it to follow and to overcome the competition in the industry.

In fact, many complementary general factors affect and influence the intensity of the Research and development process of a company, and support in defining the proportional relation among the R&D, R&D cost, firm's production, accumulated knowledge through capturing and collecting process and former R&D, Technology and Knowledge production, such as:

- the size of the company
- rational definition of the problems that is facing the company and prioritising it
- the company capability for allocating resources(for example, time, human, money) for the R&D

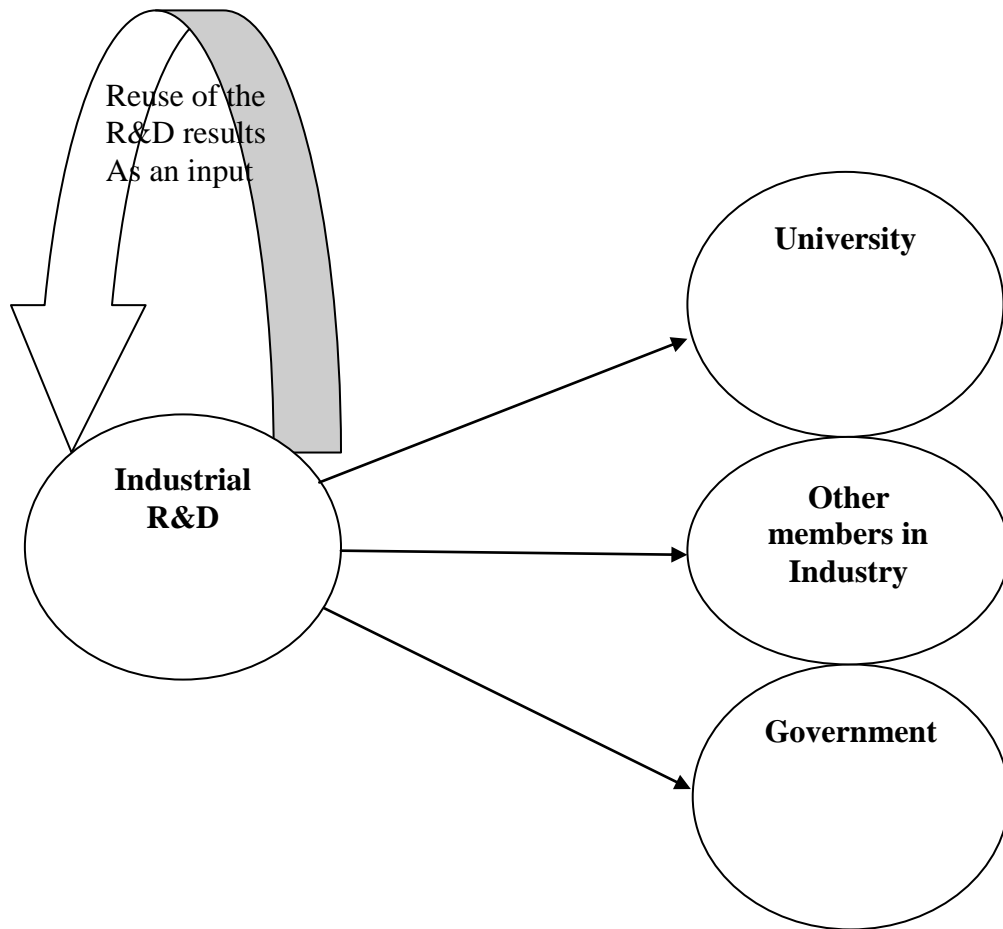
- The degree of the competition in the domain
- Firm's technical infrastructure( e.g. ICT, employees' level of education)
- Globalisation
- Intellectual capabilities and scientific background of the experts who deal with any problem and how solve it through researching
- capturing methods used to accumulate data and information for the R&D
- the amount of the heaped up data and information that will used as an input for the R&D
- The measurement techniques used by the company to assess R&D results
- managerial approaches on how to define and evaluate the relation and the impact of the researches ,its output, its input and costs on the firm's development, in other words the company's culture. <sup>[47]</sup>

As Shown in figure 7. The results of the R&D that produced by any company that was responsible for producing that knowledge in the first position , will exploited and reused again by the same company, also other firms in the industry can use it to improve company's production, marketing operations or as a needed solution for specific problems(defined and prioritized by the company). For example, high R&D intensity companies produce lots of innovative product, the company will use the production through their production cycle, or the products will be used by licensing it to other companies.

Universities find industrial R&D results an important source to develop their research on some specialized topics. This interest is widely seen by pharmaceutical and medical universities, because some pharmaceutical researches (especially on finding drugs to treat some epidemic diseases) are costly and need high technology devices and chemical and medicinal expertises that are available in some giant pharmaceutical researches. , for example, GlaxoSmithKlein company, specialized in health care and producing pharmaceutical products, spends millions of dollars per year in researches. As seen in the integrated collaborations between GlaxoSmithKlein and Yale University in an attempt to find new drugs, or in the collaborations between GlaxoSmithKlein and the University of

Cambridge in attempts to find new drugs to use in treating liver diseases, these kinds of researches become the topic of interests and research of many universities and companies.

[48] [49]



**Figure 8:** Usage of Industrial R&D



## **2.4 HOW IS ACCUMULATED KNOWLEDGE BETWEEN PARTIES IS USED?**

### **2.4.1 Usage of Acquired Knowledge by Universities**

Since the increasing of the competitiveness and the rapid developing of technologies that became an important mechanism and motivation for disseminating and sharing the accumulated knowledge by and among parties such as universities and organisations. each party by its own or through collaborating with each other on using and exchanging their accumulated knowledge to reach a collaboration that is expected to create a competitive advantages on domains like Research and development ( R&D) , innovation , etc ( as their ultimate competitive edge).

For many centuries, academics and universities had shown a great interest in finding, discovering and inventing new knowledge for the welfare of the community, on the other hand, to gain prestige in the academic world. The accumulation race among the universities achieved through extracting, heaping up, sorting, analysing, filtering and using knowledge and information from the external environment, other's experiments, discoveries and former experiences.

The heaped up knowledge by universities maybe disseminated, in which here comes the role of the universities and the academics in disseminating knowledge by using special tools to the society members so that they can use it for their welfare. The role of the university in disseminating the accumulated knowledge may be witnessed through the continuous education and training process and courses for the students, and providing them with the needed theoretical knowledge and the required methods to transform it to its applied form, which is the benefit of the acquired knowledge for universities and academicians.

Many other tools (as we mentioned before in figure 7) are in use nowadays by the universities to disseminate and use the knowledge to interested audiences (students, researchers, other universities, industry members, researching institutions, government, etc). Tools such as conferences, training courses and workshops for students and for individuals with special interests, useful models created by the universities, articles, sector analysis, technology transfer outcomes, producing innovative products and techniques, providing consulting services based on former experiences for other parties.

Regarding these tools may be use in the collaborations and may consider as outcomes of collaborative actions.

Universities also accumulate, create and use accumulated knowledge in Research and Development (R&D) processes on specific topics based on the requirements and needs by its own or by collaborating with other research institutions or organisations through joint- researching, alliances or establishing a collaborative researching centre. Spin offs and academic mobility to other universities or Firms is one of common examples of using and disseminating knowledge by the university.

Industry and university cooperative research centre (I/UCRC), funded and established by the National Science Foundation (NSF), the best illustration for the previously mentioned collaboration types. I/UCRC, is a partnership between universities and industry members, these centres are dispersed among 43 Engineering centres and 16 Computer and Information Science and Engineering centres (CISE) in USA. The I/UCRC provides guidance and resources such as the required tools and information for the local evaluators when they are planning on a specific project, timely updated data base with the necessary feedbacks about the I/UCRC's outcomes about the project evaluations. The program also provides the collaborating universities and firms with the required potential capabilities for researching and opportunities to collaborate with a party on industry related research or conducting a research based on the demand of the collaborating party.

[50]

The collaboration may be seen in these centres between the two parties through serving the needs of centres to obtain their mutual benefits, conducting researches by the centres starts based on the requirements and the welfare of the university and the industry member in the same time. Industry participate in this partnership by providing back up and supporting the centre's research needs, on the other hand, these centres will depend on participation of the graduates of the universities in conducting the researches. <sup>[51]</sup>

To illustrate the university's use of its accumulated knowledge on the welfare and the benefit of the economy and industry, The University research corridor (URC) (an alliance between Michigan state university, Michigan University and Wayne state university). The alliance took place for the need to vitalizing the state economy of Michigan and the need to provide industry with talented and skilled employees to work in auto manufacturing. (As long as 28% of Michigan's residents work in auto industry) (<http://urcmich.org/>).

URC invested and spent more than 300 million dollars in the last five years on over 130.000 projects (auto related researches) in an aim to leverage the economy and the auto manufacturing business

The universities' important and substantial contribution and role in realizing and fulfilling the welfare of the society and the other parties of the society and its members may be seen through the universities dissemination process for their accumulated knowledge, products and potential people with skills and expertises. In addition, the contribution arose because of the technological development and needs for efficient technology (such as computer based knowledge dissemination channels) and efficient knowledge (e.g. the know-how, know-why and know-when) that considered as one of the important infrastructural requirements of industry.

For example, universities provide reviews, studies and analysis about industrial sectors and the flow of the different functions in production, providing solutions for some of the current matters facing the economy or the industry, and improving the technological and managerial skills of industry. In a collaborative step by Universities, Massachusetts Institute of Technology (MIT) started to demonstrate researches and required information to solve the current problems of firms in the business world by using websites ( such as MIT Sloan management )contains articles, analysis and videos describing the latest researches and analysis.( <http://sloanreview.mit.edu/>) . MIT also participated in alliances with companies to share each other's accumulated knowledge, alliances to develop new techniques and new products through sharing each party's human capital, resources, laboratories and technological skills, alliances such as:

- Amgen Company (pioneer in biotechnology collaborated on developing and performing related researches) in 1994, the company researchers started to overlap with the available experiences of university professors and researchers of the Biology and Brain and cognitive department on developing their researches.
- Merck Company (pharmaceutical company) in 1997, the company focus on research driven activities in developing the company's pharmaceutical products, this collaboration with MIT started on educational and researching.
- Ford motors Company in 1997, this alliance was budgeted over \$20 million dollars, the reason of the collaboration was to developing the educational and engineering skills of Ford Company.
- Nippon Telegraph and Telephone (NTT) in 1998, this collaboration took place between Nippon Telegraph and Telephone Corporation and Computer Science department and Laboratory of MIT, the collaboration focused on developing telecommunication technologies and creating new one.

- Merrill Lynch company in 1999, Merrill Lynch company collaborated with the School of Engineering , The school Architecture and the Sloan School of Management, \$15 million was the fund of the alliance on conducting projects and researches on financial engineering and management , in addition, the company donated \$5 million to aid MIT for integrating financial technology education among the graduates
- DuPont Company( biotechnology and genetics researches company) in 1999, this alliance is known as DMA that extends for DuPont-MIT alliance, the aim of this alliance is ensure the advancement of biotechnological researches by depending on MIT expertises in engineering and Science and DuPont's expertise in biology and genetics
- Microsoft in 1999, the alliance that took place between MIT university and Microsoft to boost information technology of the university through establishing a project called ( project-I-campus ) , the project involves a producing collaborative projects that involves the members of the university from every level that include students, faculty and research centres members from the university side and the researchers and the technicians of Microsoft Company
- Hewlett Packard ( information technology company, cooperated on developing and managing digital information and enriching the devices and the techniques used by the company) in 2000

These alliances had a positive impact on MIT in one hand, and the companies that participated in the partnerships on the other hand. for MIT, becoming a part of these partnerships provided MIT a long-run commitment from the partners to provide necessary funding for launching research and development (R&D) activities.

## 2.4.2 The Usage of Acquired Knowledge by Industry

On the other hand, the accumulated knowledge produced by the industry members, university members, or extract by industry members from the external environment becomes a precious asset for the companies and may become the essence of competition to maximize the profitability of the organisation, to produce new knowledge, to secure the company's reputation and to make the accurate decision. The accumulated knowledge by the industry is exploited by the organisations to maximize the competitive edge and to optimized the decision making process (explain the relation again between the competitiveness and profitability in general term)

Companies may use many tools and methods to accumulate knowledge through its continuous organisational processes and actions; here we can see some of the tools and actions that may use by Industry members to accumulate knowledge:

- Performing market analysis by the company
- Customer behavioural analysis
- Evaluating the competitive environment
- Analyzing the techniques and strategies used by the company in order to modify it if required
- Analyzing the competitors' techniques and strategies in production and marketing the product
- Benchmarking
- Observing and analyzing professional behaviours and expertises, on organisational and interpersonal level
- Studying and developing the (know-how), and extracting new (information and data) from it (transferring tacit in to explicit).

The accumulated data and information may use in Research and the Development processes (R&D) by the industry, to cope with the challenging competition that the industry is going through and achieve the competitive advantage and innovation.

And by using accumulated knowledge it means using efficient knowledge (especially when is based on former experiences), this process may increase the strength, the accuracy of decision-making process of the organisation's members and may influence the flow of the organisational functions and operations properly relocating the company's current situation from failure to success

A company may disseminate or may exchange its accumulated knowledge in other members in the industry; the dissemination process may seen in the collaborations with other members of the industry or universities, as may witness in funding universities projects), alliances, acquisitions, mergers, joint ventures, joint – R&Ds, seminars, conferences, formal meetings, non-formal meetings, publications, articles and many other ways. From the previously mentioned example on the university and industry collaboration (MIT's partnership with industry members), the produced knowledge of the partnership helped the firms with assorting scope of their relationships and their activities in a broad-concept. <sup>[52]</sup>

## **2.5 PERIPHERAL EFFECTS OF DISSEMINATED KNOWLEDGE , AN EXAMPLE**

Knowledge dissemination and knowledge transfer processes within organisations and universities and with each other may observe on continuous bases on aims to match with the required goals to achieve by these institutions and to add value to the goals or the achievements in order to reach the win-win situation when the goals performed.

For universities the value added of transferring the results of research and development outputs (inventions, innovations and discoveries, etc) by the universities may include mainly:

- Gaining recognition (prestige) among the universities and academic community members
- gaining the required financial earning
- supporting and developing the education process within the university
- Finding enough funding for researches when needed

A successful transfer for universities' outputs or other industrial research and development processes outputs may achieve through:

- ❖ either industry's commercialization for the academic output of the researching process, this process:
  - ✓ may increase the financial earnings and profits of the firm and its shareholders
  - ✓ may contribute in developing the company economically, professionally and socially
  
- ❖ or by applying the new findings to the educational processes of the universities in order to provide the society with highly qualified graduates (providing qualified human capital).

Integration and collaboration on disseminating and transferring knowledge between two or more parties may enhance the parties' capabilities by maximizing the required sources (Scientific for universities, new production techniques for the company) and creating value from the efficient information gained through the collaboration.



For example, the partnership between the University of Kentucky and Toyota Company (a Giant Japanese Multinational Automaker) participated in creating a win-win situation for the two parties; the partnership achieved through the continuous researching by the graduates in the engineering laboratories of the university on developing and finding solutions for any problem facing the production process of Toyota.

Toyota's win situation (Value added) was finding solutions for some of the production problems in the universities laboratories, altering these solutions into its applied form in the assembly line of Toyota's factory.

On the other hand, university's graduates gained more experience by dealing with the problems facing the production line of the company, new sources for publications and Funding (one million dollar donation by Toyota) for establishing and creating an institution in the university that deals with developing technologies.

Researches based on industrial need in the collaborations are more likely to provide the percipient firm with outcomes that may use by the firm in developing a product and any successor production process.

In a Research launched by Rudi Bekkers (Eindhoven university of technology) and by Isabel-Maria Bodas Freitas ( Ecole de management &DISPEA, Politecnico di Torino) on the performance of industry collaborations in Netherlands that included 2 surveys and 90 in-depth interviews on examining 30 collaborative projects, 575 researchers from the university side, 454 researchers from industry side.

One of the findings on the collaborations on the industry needs was, the outcomes may use on the benefit of the firms through production, developing products, or marketing new products. On the other hand, the collaborations that launched based on the universities need are more likely to face with unexpected outcomes may used on scientific development combined with a high rate of spillover.

It is observed also through the analysis that launched by DAMVAD (research based consultancy on the behalf of university of Copenhagen) (based on the supported data by university of Copenhagen) in June 2012. The research has established to analyze the effects and the benefits of the collaborations of University of Copenhagen (from 1998 until 2009) with 1537 different companies (1020 Danish, 517 foreigners) to the two collaborative parties.

The research showed a strong relation between the participating companies in research and development activities with university of Copenhagen and the progress of employees' productivity. In which the research showed an average increase in an employee's productivity reached to 7000 Euros and as 2.43 million Euros per company with 1.5 billion Euros as an economic impact by 625 companies only.

In addition, it showed that through the collaborations the university gets a chance for applying its theoretical knowledge through the researches, getting new sources and inputs for publications and researching, also finding new valuable funding for Research and development activities. On the industry side, the analysis showed that industry will be capable of accessing to new experiences and skills and will get the optimal results for its researches.

Accordingly, since technology is rapidly developing in a competitive manner and since computer-based, web-based and social network tools become indispensable infrastructural instrument in organisations' activities, especially in capturing, disseminating, exchanging knowledge activities and developing organisational activities within organisations and with other parties in collaborative attempts and actions. As result for these changes, we may see that organisations (universities, firms, and governments) are in a continuous quest for competitive tools and developed methods for disseminating and exchanging efficient and effective knowledge competitively in an adaptive manner with the current computer based and web-based technologies within their organisational activities and through their external organisational activities.

Web based and computer based services may consider as an important knowledge asset for organisations if it was used in dealing with creating tacit knowledge, converting the existing tacit knowledge to explicit knowledge, transferring explicit knowledge , exchanging knowledge and collecting feedbacks about organisational activities which may take place at anywhere of the organisation. Using these services in disseminating knowledge may help Individuals to become more prone to comprehend and raise their problem solving skills, finding innovate solutions when they are using web-based tools in their work-driven queries. <sup>[53]</sup>

In a study by Ileana Hamburg, (Institut Arbeit und Technik, FH Gelsenkirchen) for examining the impact of web-based training on for the staff in small and medium size enterprises (SME) ;The study recommends that Web-based Training for the staff of an enterprise has an impact on the SME employees and will improve their competencies and the knowledge management activities of the enterprises.

We may conclude from the previously mentioned examples and the empirical studies that exchanging knowledge between universities and industry and collaborating by using each party's accumulated knowledge on the benefit of each party or separately or collectively, may have a constructive impact on developing the skills of each party.

It May create awareness of the importance of organisational self-developing on managerial, marketing, technical skills and to aware the importance of launching and implementing a R&D activities in continuous manner. For the sake of improving and developing, the value of the information that each party have from one side and interrelating the new technologies in knowledge transfer and exchanging process for a better result. <sup>[54]</sup>

## **2.6 CURRENT STATE OF INDUSTRY AND UNIVERSITY COLLABORATION IN TURKEY: A POLITICAL APPROACH AND CURRENT INITIATIVES, THE IMPORTANCE**

### **2.6.1 Importance of University Industry Cooperation in Technology Policies: Some Extents**

As we already mentioned, scientific knowledge produced by the university is implemented in different areas of the industry in different forms of technology. In the country context, this process have also been noticed by the policy makers, where the related cooperation have been mentioned in different domains of policy making plans and roadmaps.

#### **2.6.1.1 Collaboration Issues in the 9<sup>th</sup> Development Plan (2007-2013)**

Regarding the fact that Turkey follows a planned economic policy approach since 1960's the most important policy guidelines can be found in the development plans, where, significant targets to be achieved in different domains of the country economy have been referred. In the 9<sup>th</sup> development plan, the importance of university-industry cooperation's has been mentioned in terms of R&D development capacity and the technology development centres establishment. Here it can be assumed that the cooperation in between is contemplated as a tool that might facilitate technological development. In fact, the establishment of technology development centres has been followed as an important policy measure since 1992. SMIDO, is in charge of providing support for technology centres establishment. At the same token, in the higher education specific expertise commission report (2000) this cooperation has been first referred as an possibility to increase job opportunities, and the efficient product development and marketing capabilities. The cooperation has been assumed as a tool for solving problems faced during the processes. <sup>[98]</sup>

### **2.6.1.2 2013-2017 Strategic Plan of the Ministry of Science, Industry and Technology**

Similarly In 2013-2017 strategic plans of Ministry of Science, Industry and Technology, the collaboration issues have been referred under two important targets:

- Providing a planned improvement in science, technology, R&D and innovation
- enhancing awareness on science, technology and innovation culture in different layers of the society.

In both targets, the collaboration has been perceived as a co-organisation of activities with the participation of university and industry representatives. Both targets establish sub targets of strategic goals. (This situation was more or less similar in the previous plan where, the collaboration target was co-pursued by SMIDO and Government Planning Organization.

SANTEZ (Industry dissertations thesis projects) is another possibility for perceiving the collaboration between university and industry. Since 2007, SANTEZ aims to institutionalize the collaboration between university-government and industry and increase the competitive power in general terms. For this reason, thesis projects concerning the industry are supported. <sup>[99][100]</sup>

### 2.6.1.3 SMIDO's Strategic Plans

In 2011-2013 strategic plan of SMIDO, one of the targets is to provide collaboration between SMEs and universities. In order to do this, it has been aimed to hold sectoral meetings, which will serve as a knowledge exchange platforms, to increase the number of co-research centres and facilitate the SMEs to benefit from the research centres. In latter goal, another important issue seems as the increased inclusion of SMEs in the research projects, in other words, promotion of the research projects, which specifically designed to ameliorate SMEs' infrastructure. <sup>[101]</sup>

### 2.6.1.4 Science and Technology Roadmap of Turkey-Vision 2023

In the section including national science and technology strategy, the cooperation is referred in terms of strategic technology areas and formation of cooperation networks in the country as focal issue. In the same document the importance of the related cooperation has also been underlined in terms of funds that have to be allocated in R&D, national innovation system, required modifications that have to be made in the current academic system. **Another important reference is the formation of the web-based strategic partnerships in between the firms, which is also a strategic priority for production processes.** Potential benefits that could be retrieved are also mentioned in the basis of different technology intensive prior sectors. <sup>[102]</sup>

## **2.6.2 Current Different Projects held in between (Some of the Examples of Current Initiatives held)**

One of the reflections of the followed policies' effect can be assumed as the increasing trend in the current initiatives in different parts of the country. In Turkey, there are currently some projects held which are briefly mentioned below;

1. USİMP (Adana): (University Industry Collaboration Centers Platform): USİMP Established in 2007 in an aim to transfer technologies produced in universities to the society as well as to improve the technology transfer mechanisms. Another aim is to transform the industry as an entity, which produces its own technology via close collaboration with universities. Knowledge production and exchange of commonly acquired experience is one of the goals for creating the entities, which will act in the university-industry collaboration process.<sup>[103]</sup>
2. Aksaray University: The University-Industry Collaboration Centre has been established in 2012 aims to increase innovation-focused research and technology development in order to contribute industrial development. To reach the vision, the centre plans to prepare research environments in between the parties by producing projects and commercializing creative ideas.<sup>[104]</sup>
3. GUSİAP (Gaziantep): In collaboration with Gaziantep University, this is an independent initiative called as “Restructuring of University Industry Collaboration Project”. In this project, parties collaborate in the aim of improving the innovation and R&D infrastructure for all parties, development of qualified human resources recruitment potential, development of collaboration culture and activation of entrepreneurship and innovation models.<sup>[105]</sup>

4. ÜSAK (Istanbul Aydın University): University/Industry Cooperation Coordination Centre: This coordination centre mainly focuses on collaboration with the industry at the project basis. In this context, the centre also aims to provide required infrastructure for undertaking R&D activities, technical and expertise support for the firms. Dissemination of the project calls to the industry members is another activity of the centre. <sup>[106]</sup>
5. ESOGÜ (Osmangazi University): The department of project development and support deals with collaboration projects <sup>[107]</sup>
6. Ege University Industry Services Office (EBİLTEM): Mainly acting as a search engine, EBİLTEM provides web-based search on academics, project ideas, device analysis inventory and graduate thesis<sup>[108]</sup>
7. Cankaya University: Since 2007, the university does undertake different collaboration projects mainly in cooperation with OSTIM including, clustering of construction machinery cluster, firm improvement projects held by BSc. students and technology transfer milieus and so on. Concentrated mainly in cluster development issues, Cankaya University operates with two centres, where, different projects are held. In the same context, various certificate programs and lectures for university students are also implemented.
8. Additional initiatives are the ones held by Bilkent, Mustafa Kemal, Kocaeli (UNISAN) and Anadolu Universities that aim to the similar purposes of the previous ones.



## **CHAPTER III**

### **3.1 WEB-BASED PROFILE (Ease of use, ACCESSIBILITY FEATURES)**

The website (UNICBazaar) is designed to facilitate and to enhance information dissemination process for the registered users from universities, firms and potential project seekers in the website. The members exchange information (especially accumulated ones) through organised, systematic, user-friendly services and tools provided in the website, in this context, UNICBazaar aim to help both parties' users in their queries and searches for different topics. The website and its browsing and searching engine designed and built by JavaScript, HTML5 and Java. In this regard, the site includes for its registered visitors services that might be needed by the two parties' members. Services such as news about latest collaborations, collaboration opportunities offers and proposals, industry and university related social events, consulting services for firms and university members, collaboration opportunities on product development, careers and vacancies opportunities, and lastly information about managerial topics. Moreover, enhancing a better recognition of the academician ,through providing contact information, online Curriculum Vitae (CVs) of university's members, backgrounds and the achievements of those whom are interested in providing consulting services. As a result to simplify the dissemination process of the necessary information by university to the firms separately and collaboratively and other services that will explain in details in the next sections. UNICBazaar is devoted to achieve an effective and an efficient information transfer for the information seekers.

In an aim to lead for further success for the universities and firms by providing the necessary tools and searching engine and an online access to the required data that may help the two parties in their searches that may abolish and reduce the distance between the collaborative parties. In addition, UNICBazaar might help firms and universities to find the required consulting services and consulting proposals , collaborative opportunities ( such as collaborating on developing a product, skills , managerial and technical skills , etc)and research and development(R&D) collaborations, and to upgrade the two parties' knowledge through simplifying the knowledge transfer between the two parties. <sup>[55]</sup>

### **3.1.1 UNICBazaar WEBSITE'S USER FRIENDLINESS FEATURES**

The website (UNICBazaar) itself:

- Provides a Database that contains data and information posted by both university members and industry members and required by the two parties members, the website can be accessed via Web browser through providing and writing the URL (uniform resource locator) of the website
- Provides web-based media and potential attractive services ( organised systematically )to create direct interaction between university members and firms and for providing an environment in which parties may be able to collaborate on a mutual beneficial opportunity
- Provides an interface( friendly user) that can be perceived easily by the users to accomplish the tasks effectively and efficiently, regarding that users that have a basic knowledge and background for the use of web-based and computer-based tools and searching methods even the most computer illiterate users may be able to use the tools easily

- Provides searching tools and engines that simplifies the navigation process through the contents of the website and hyperlinks to help through retrieving the required information and services
- Provides hints and tips about the provided services of the website and how to use it in the Frequently Asked Questions (FAQ) page
- Provides a service page in the Bazaar services that will be explained below for the users to write and post their requirements, questions and solutions for a specific problem and they may get the required consulting services that will be posted by those who are related with the topic or by providing consulting services.
- Simplifies the searching process for information, solutions, articles, books, videos describing a topic, events news, collaboration news that will help the Registered user in the website to achieve a specific task in a less time.
- Provides communication services and collaboration services at different time (Asynchronous tools) such as e-mail service, e-books, articles , databases , publications, contact information and uploading and downloading files.
- Provides synchronous tool (real-time communication tools) to help the users to accomplish in their tasks such as chatting tools, audio and video conferences via Skype and instant messaging services.
- The website is provided with descriptive images on each service labelled with alternative attributes describing service's title and type, no animation ,flashing or blinking images used in the website.
- Relative font size compatible with users' usage specified in the web browser.

- texts in pages are properly structured in the textual webs and pages' titles.
- provides links and contact information of academicians and firms members whom are ready to collaborate or provide consulting services.

### **3.1.2 OFFERED SERVICES BY UNICBazaar**

The website service offers:

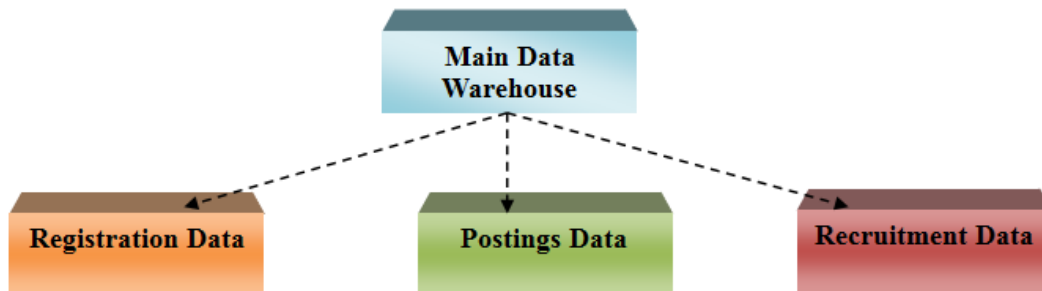
1. Searching engine for data, information, and articles and training notes of different projects uploaded by the members to the database of website through the admin of the website and the electronic libraries of universities, and Video links about the queries of the users.
2. FAQ (frequently asked questions) page, the page contains answers for the frequently asked question by the users.
3. Mailbox, which can be used for contacting purpose that will help users to be in contact with each other and ask their question from those who are related or specialized with the topic of their queries.
4. Chat room, which provides online communication between users.
5. Two free posting areas, the first one enables user to post their conference request, and second posting area to help the users to post their questions and their problems, the postings are controlled on daily base by the admin to provide the users with required feedback.

6. A data warehouse, to save the CVs of those who are searching employment and those who are searching for employees.
7. A link with the qualifications of the academicians and the specialized persons and their achievements, articles, etc, the aim of this page is to provide the name, contact information of those who are willing to collaborate, provide consulting services, participating in seminars, conferences and workshops.

### 3.1.3 FEATURES OF DATA WAREHOUSE

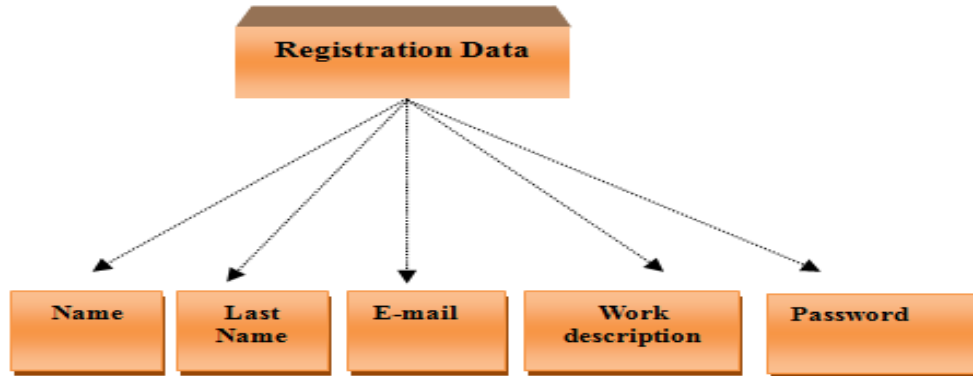
The system is connected with the main data warehouse that will include sub-databases classified according to its contents The data will store in the main warehouse according to its classifications:

- Registration Data
- Postings Data
- Recruitment Data



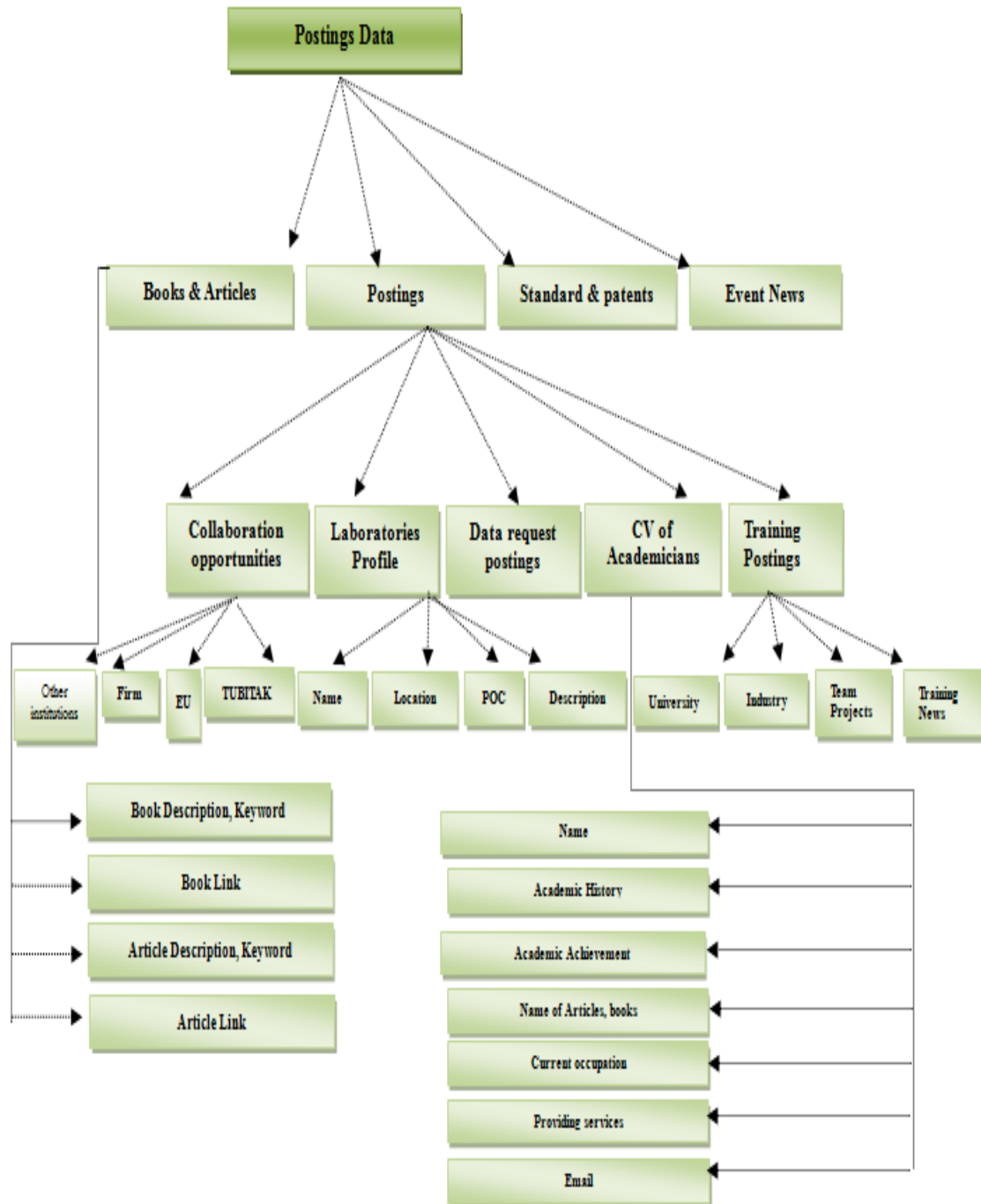
**Figure 9:** Description of the Main Data Warehouse

1. Registration Data : the stored information in this Database that will contain all the registration information of the individuals that will be classified according to their party university or industry



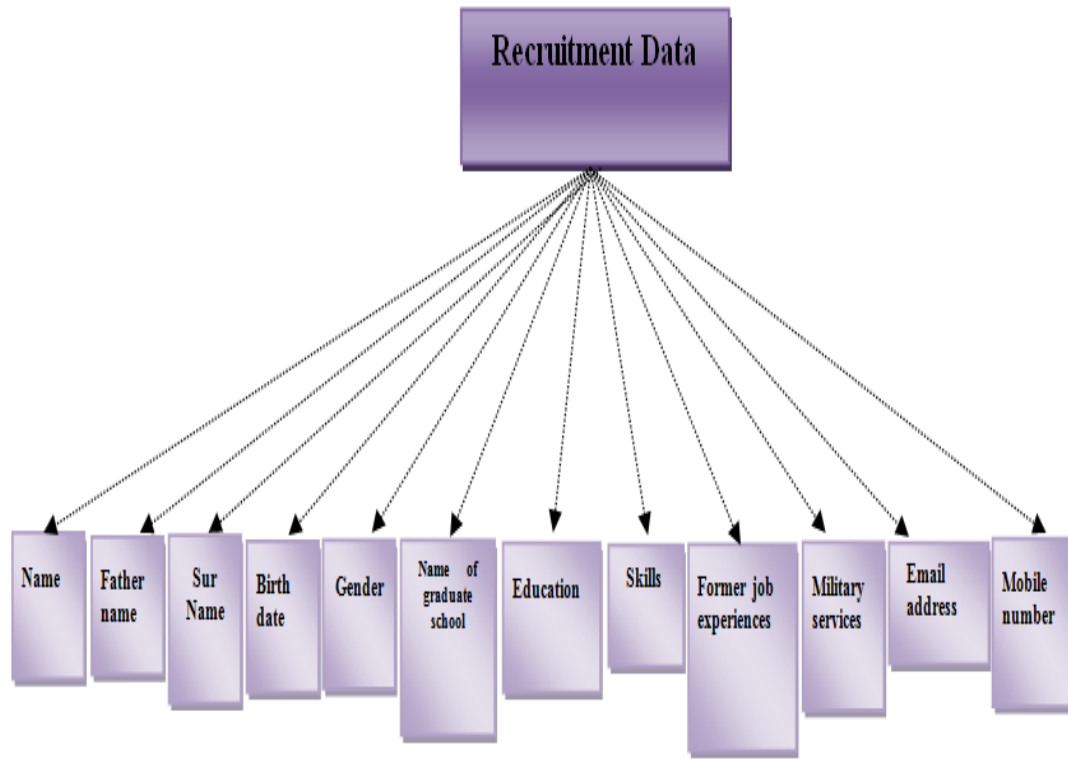
**Figure 10:** Description of the Registration Data

2. postings Database: will include all the postings that will be posted by the web administrator classified according to its type



**Figure 11:** Description of the Posting Data

3. Recruitment Data: all the recruitment applications will be stored in this part of the main warehouse that will be ready to use by the administrator of the website and those who are seeking for appropriate candidate for their job vacancies :



**Figure 12:** Description of Recruitment Data



The information will be stored in tables with identifying to keys. To avoid the repetition in the data retrieval process from the database the primary key (a set of one column's value or more in a single table that provides uniqueness to one row of data in any table of a database) of each table is used. The foreign key will enable to relate the fields in remaining tables. The primary and foreign keys for each table are listed in the appendix part.

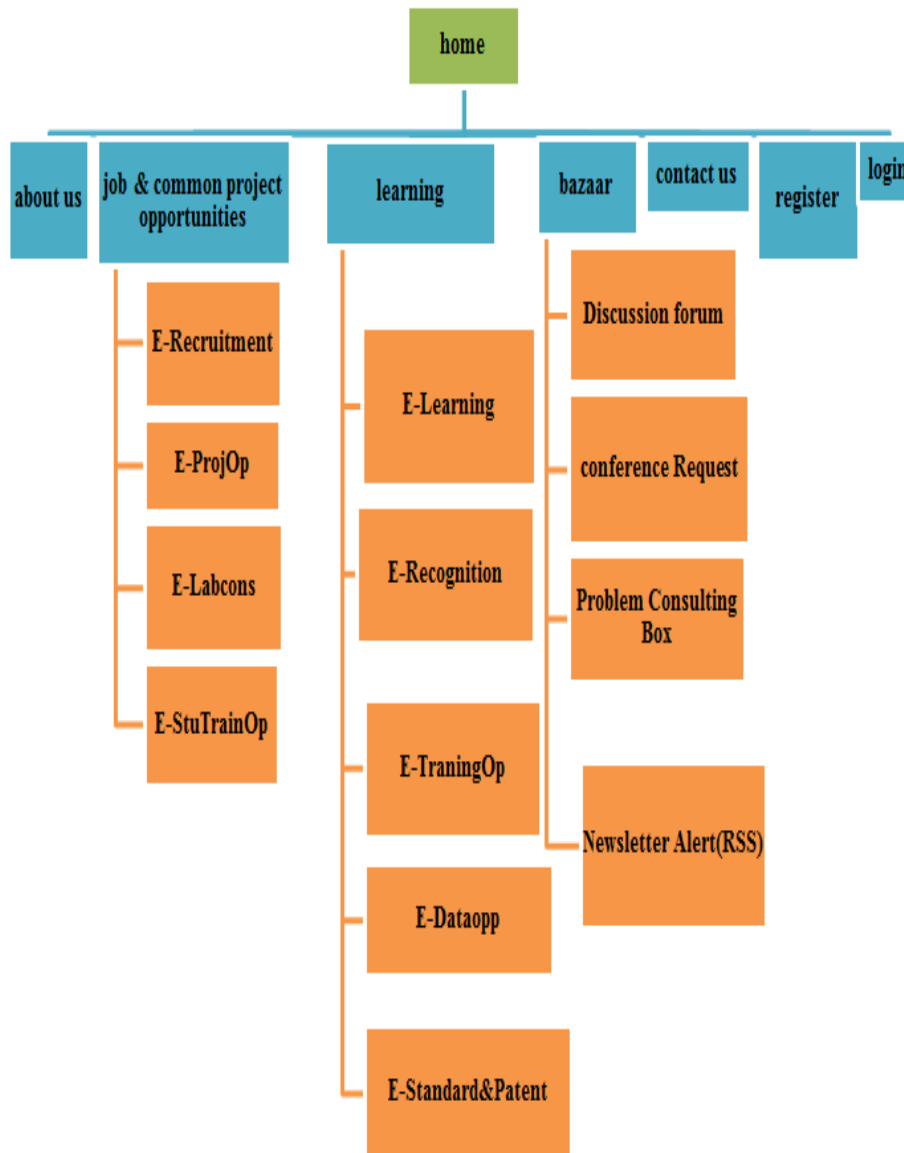
For example in (registration data), the only information that cannot be repeated for any entity is the ( E-mail) address , because when any user gets an account in any e-mail services , he / she will get a unique address. So accordingly, the E-mail column of the registration information table will be the primary key that will provide uniqueness for the data table.

Moreover, for (Posting data), providing a unique ID number with each posting that will differentiate it from other stored data, as a result, the produced row will be unique and distinguished from the others

Finally , for ( Recruitment data) , Mobile number will be the primary key for the table , here again, information such as mobile numbers are unique , and only one person can have a particular number that will be different from others.

### 3.1.4 UNICBazaar CONTENTS

The website consists of a main page (home page), sub pages, functions and services that are located in the navigation bar of the website in a special order based on the provided services in tabs as we can see in the sitemap of the website below:



**Figure 13:** UNICBazaar' Website Map

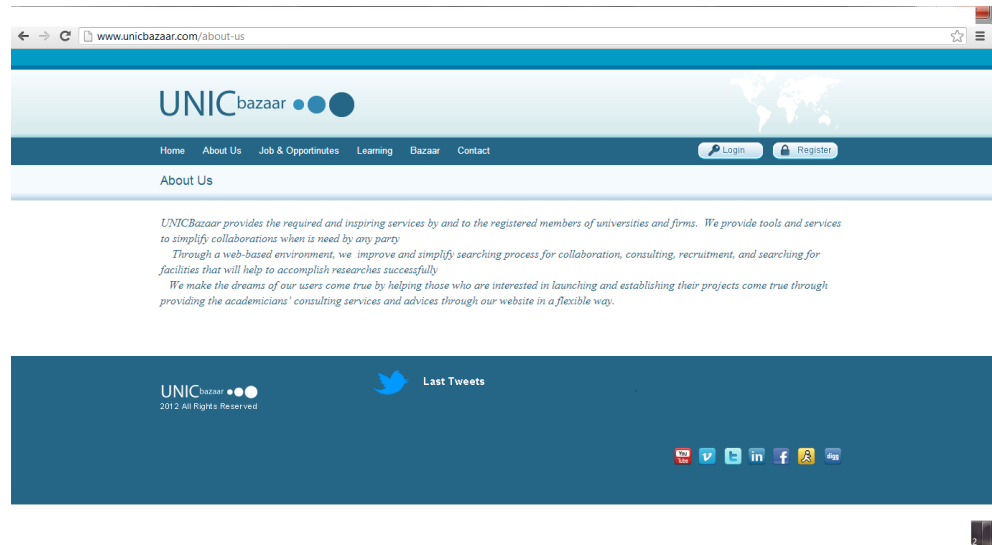
The website includes:

1. the home page: which is the main page , this page will be used by the users to access the website by writing the URL([www.unicbazaar.com](http://www.unicbazaar.com)) of our website in the web browser , the homepage contains the subpages and the provided services( hyperlinks) of the website that are
  - about us
  - job & common project opportunities
  - learning
  - Bazaar
  - Contact
  - Login
  - Register



Figure 14: Illustration of the Main Web Page

2. about us : contains all the information about the website, the reason of designing the website , the targeted audience of the website, mission, vision and contact information



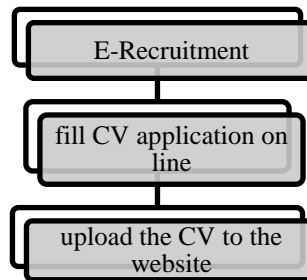
**Figure 15:** An Illustration of the About Us Page of UNICBazaar

3. job & common project opportunities : contains all the required services for both university and industry members E-Recruitment , E-ProJob, E-Labcons, E-StuTrainOP as it is shown in the figure below:



**Figure 16:** An Illustration of the Job &Opportunities Page and the Provided Services

- E-Recruitment: provides the recruiting services for those who are searching for jobs by using the electronic media and the potential ones who are willing to become a member. This service can help in matching the candidates with the vacancies of the firms who are in search for personals for the job vacancies, on the other hand, this process will help in speeding up the search process of those who are in search for a job. The page has an online Curriculum Vitae (CV) to fill which, jobseekers will fill the online Curriculum Vitae (CV) and then they will upload the Curriculum Vitae (CV) to the main database of the website that will be checked by the admin and the firms who are looking for candidates for their vacancies.



**Figure 17:** The Flow of Process of E-Recruitment Page

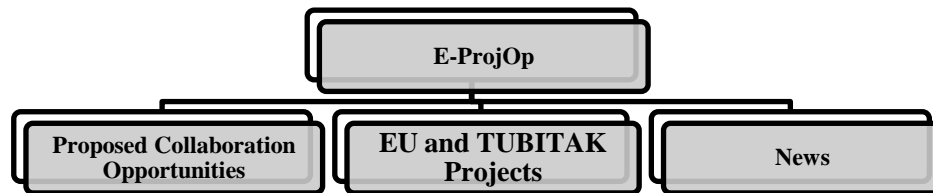
The screenshot shows a web page titled "Recruitment CV". At the top, there is a navigation menu with links: Home, About Us, Job & Opportinutes, Learning, Bazaar, and Contact. Below the menu, the page title "Recruitment CV" is displayed. The main content area contains a form with the following fields and options:

Name	<input type="text"/>
Father Name	<input type="text"/>
Surname	<input type="text"/>
Birth date	<input type="text"/>
Gender	Female <input type="button" value="v"/>
Education	university <input type="button" value="v"/>
Skills	<input type="text"/>
Military service status	served <input type="button" value="v"/>
Former job experiences	<input type="text"/>
E-Mail address	<input type="text"/>
Mobile Number	<input type="text"/>
Name of Graduate School	<input type="text"/>

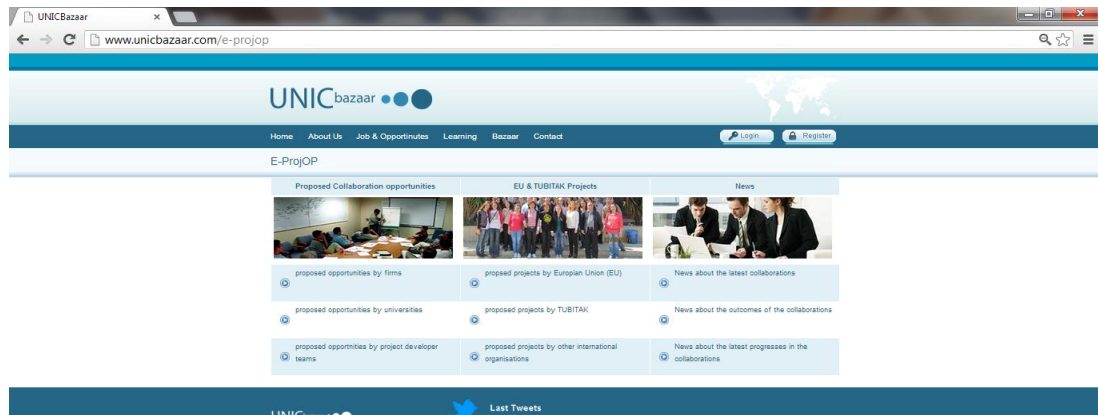
At the bottom of the form is a "Submit" button.

**Figure 18:**The Recruitment CV and Its Content

- E-ProjOp: this page will have the posting of the collaboration project opportunities that is required by the firms, universities, members of the two parties willing to work on a specific project that needs a development or consulting services. Information such as scope of the project, date of submission, profile of the project team members, the goals of the project, expected outcomes of the project, definition of the needs and the wants of the project and its targeted audience, contact information and many other information that will be posted with project requirement postings based on needs of the party. In addition, postings on demanded researches by the European Union (EU), the scientific and technical research council of turkey (TUBITAK), international NGOs and other granted proposed project by agencies , firms and universities. In addition, the news of the latest collaborations and the outcomes of these collaborations will post to this page to keep the users updated with development and the results of the collaborations.

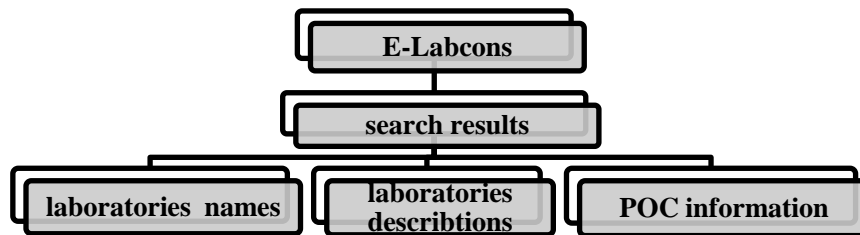


**Figure 19:** The Flow of Process in E-ProjOp

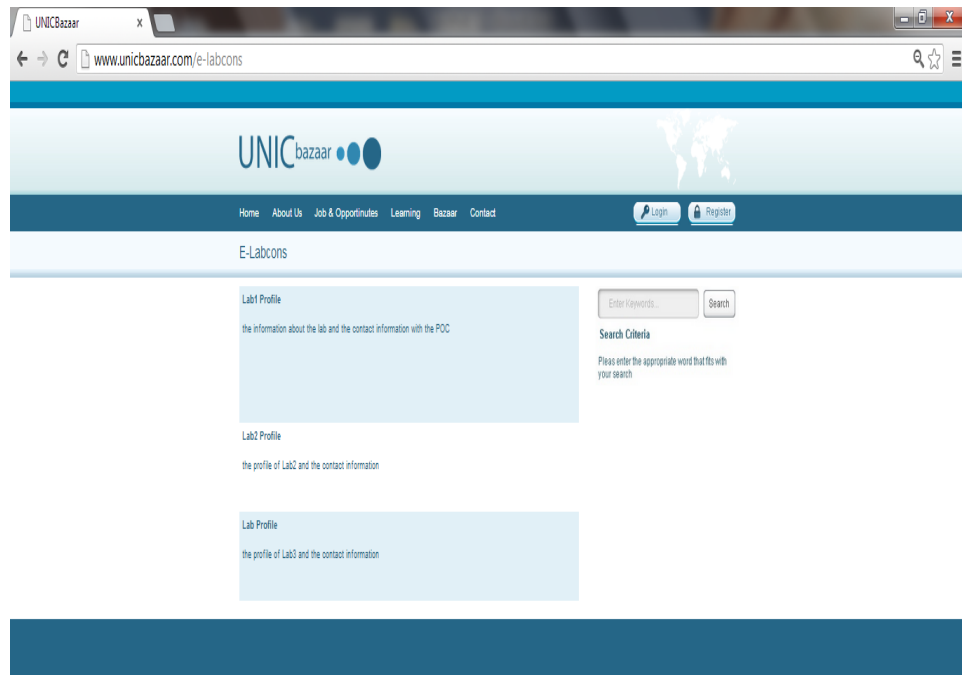


**Figure 20:** An Illustration of ProjOp

- E-Labcons: this page provides searching tool for the users who are searching for laboratories through the listed offered laboratories that are participated (by universities and firms) and enlisted in the website. In addition, it provides detailed information, criteria and standards about the available lab profiles on both sides and it provides all contact details of the related university/firm/industry zone to the users along with the contact information of the responsible person of the lab



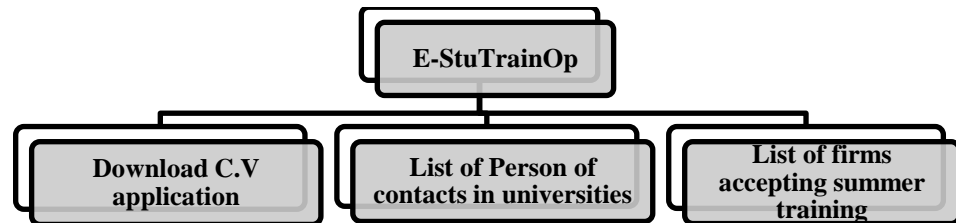
**Figure 21:** The Flow of Process of E-Labcons



**Figure 22:** An Illustration of E-Labcons



- E-StuTrainOp : this page will provide a CV that will be downloaded by the students who are searching for summer training programs offered by the firms , also it will contain a list of the potential firms that might accept summer trainees from university students appears along with the names of contact persons in the firms & responsible professor in the university side. Students with will submit the CV by hand (manually) to the person of contact from the university side, or they will upload it to the database of the website and the searching process will be achieved through the stored data. Students should fill information in the CV such as their department in the university, skills, cumulative Grade Point Average (CUMGPA) and other information that firms will define and t will use as searching criteria.



**Figure 23:** The Flow of Process of E-StuTrainOp



**Figure24:** An Illustration of E-StuTrainOp

4. Learning : this part will have 5 activities provided through the tabs that is added to this part ,the services are:

- E-learning: we called this part as e-learning, it is provided with searching engine in which when the user is searching for a specific topic or a solution for a problem. the user can search through the searching engine and the results will vary between books, articles, PDF files either original or produced by firm members or university professors independently, Past lecture notes for firms training, independent lectures on project management/technical issues by firm reps/professors either in written & downloadable form or in videos. So this is one of the asynchronous services

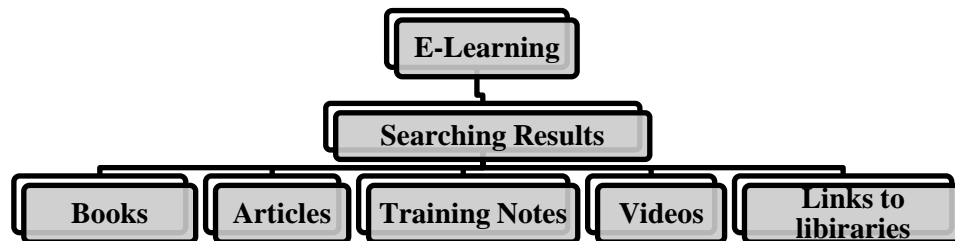


Figure 25: The Flow of Process of E-Learning

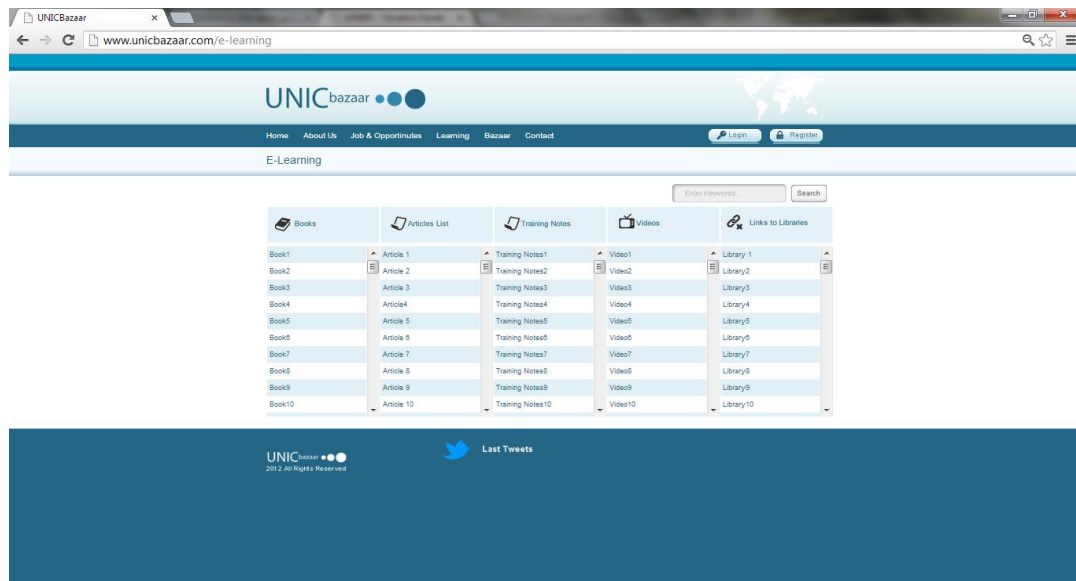
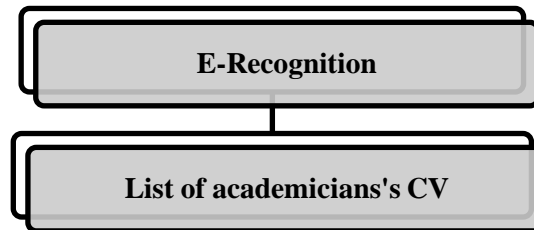
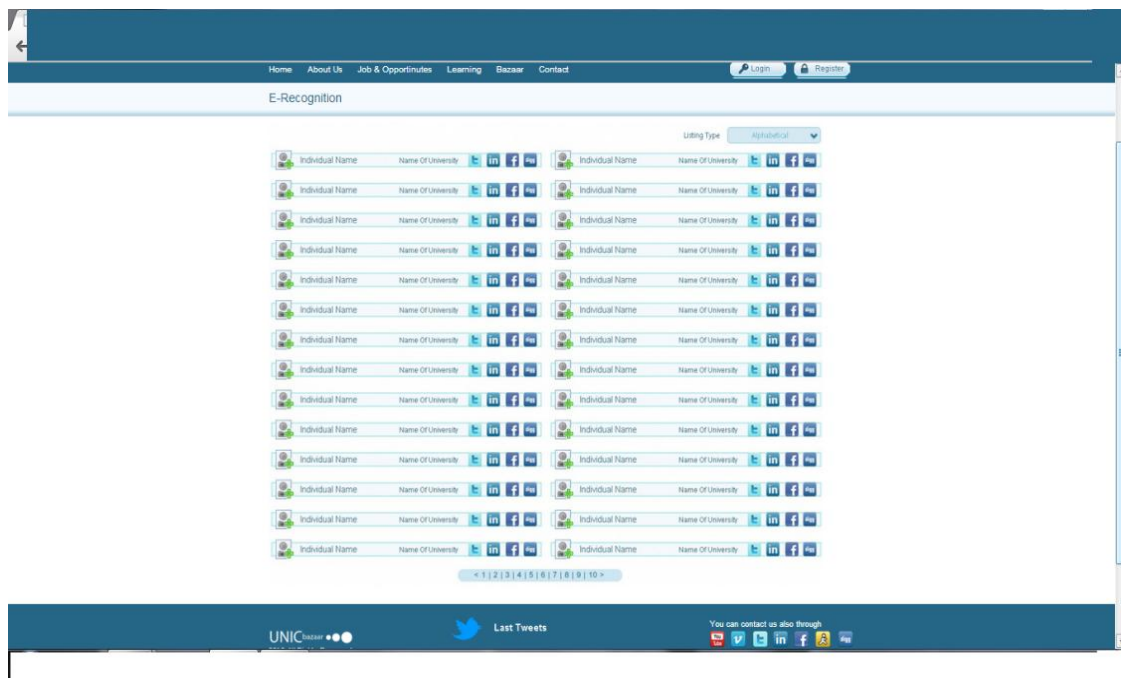


Figure 26: An Illustration of E-Learning Page and the Searching Process

- E-recognition: provides the access to the professors and the firms representatives' online Curriculum Vitae CVs (after their approval). The aim of this service is to serve the members with a list of candidates that are ready to provide consulting services for both sides, specialized in a topic or a field of interest of the two parties' members.

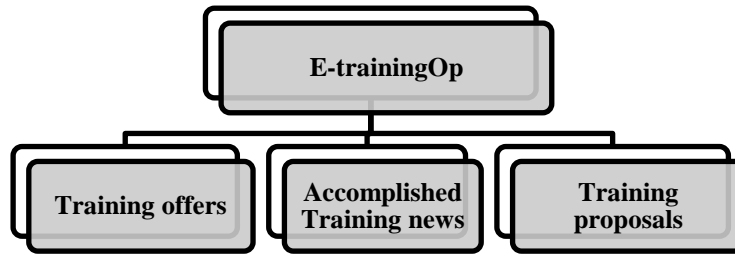


**Figure 27:**The Flow of Process of E-Recognition

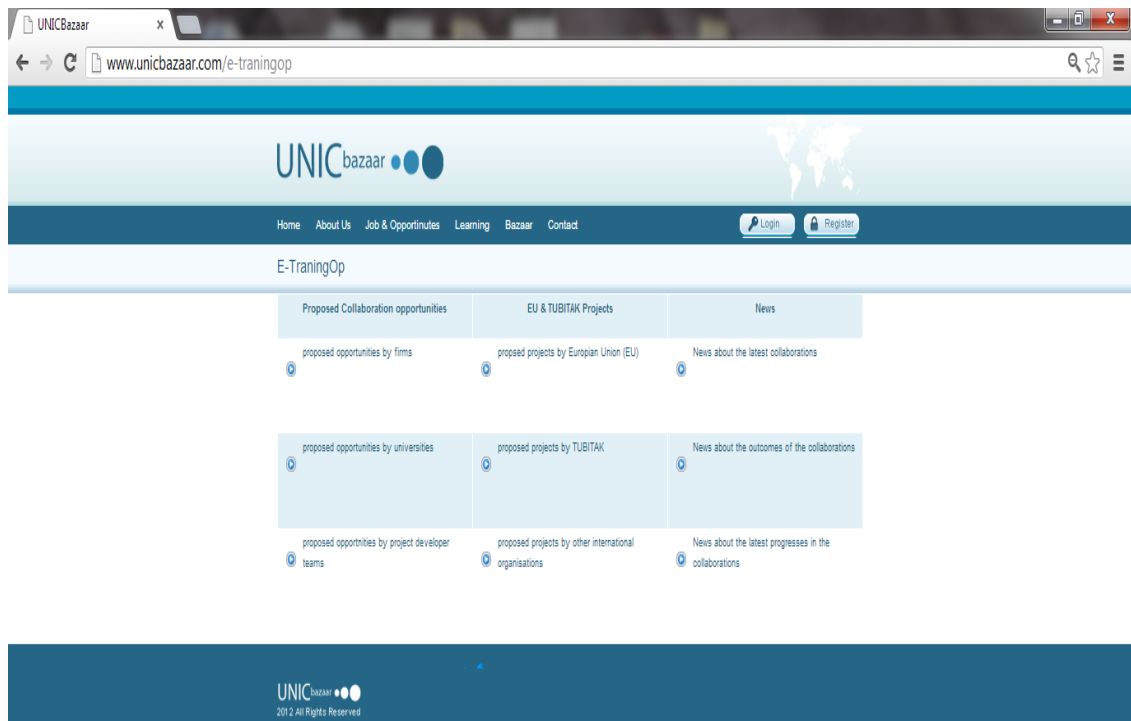


**Figure 28:** An Illustration of E-Recognition

- E-TrainingOp: this link will provide the training offers and proposals provided by the firms and universities, all the suggestions for training from professors and firm members appears for the firms along with the contact information . In addition, the link will keep the individuals updated with the accomplished training news and its details

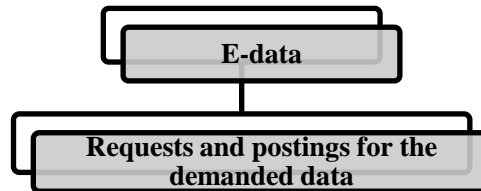


**Figure 29:**The Flow of Process of E-TrainingOp

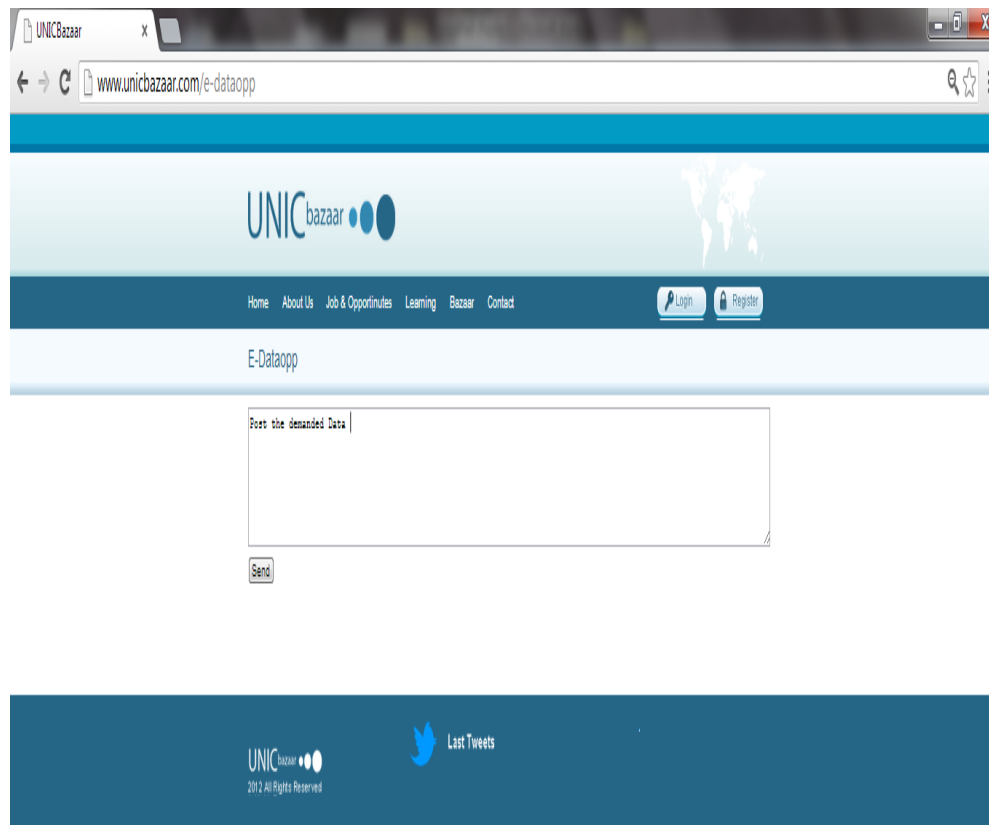


**Figure 30:** An Illustration of E-TrainingOp

- E-dataopp: this service will provide the Data demands, postings of the requested data from both sides to the website that will be checked by the administrator to give the required feedback to the data seeker

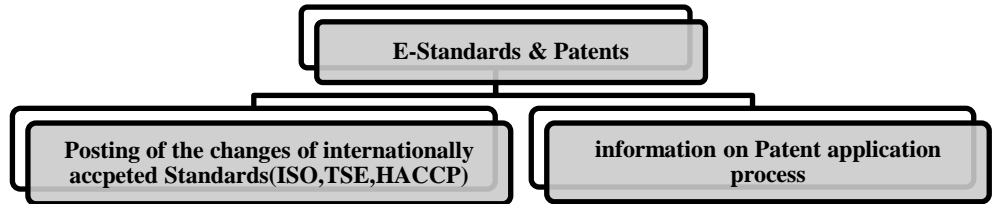


**Figure31:** The Flow of Process of E-dataopp

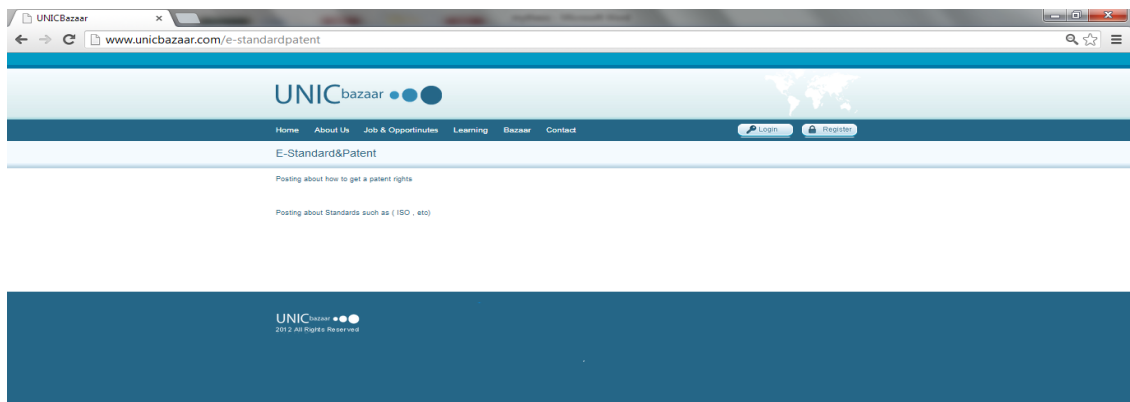


**Figure32:** An Illustration of E-dataopp Page

- E-standard & Patent: this link will provide Postings of & the changes in the recent, internationally accepted standards (e.g. HACCP,ISO, TSE).Information on patent application process, these information will be posted the admin



**Figure 33:** The Flow of Process of E-Standard & Patent



**Figure 34:** An Illustration of E-Standard & Patent Page

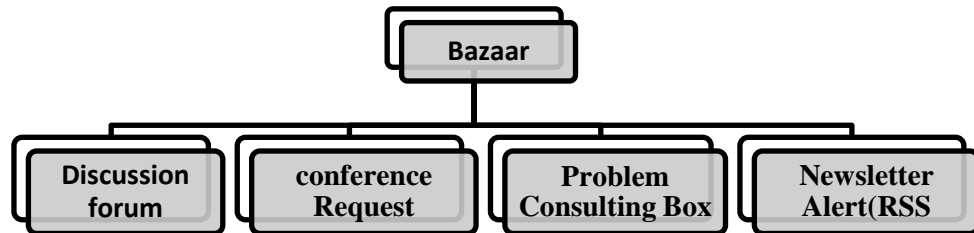
5. Bazaar: is a project Bazaar, the bazaar part provides four services (as shown below in Figure 34), that are Online discussion room, Conference request, Problem consulting box, Newsletter alerts (RSS). These services are related with the needs of the members (Posters) of the UNICBazaar to provide the tools Medias that can help the user to communicate asynchronously and synchronously. The poster is someone (firm expert, academics) who has an idea for project call, or in progress writer of a project proposal searching for a partner.

The user is an expert pm a specific subject and wants to be a project member, a project of his/her own interest.

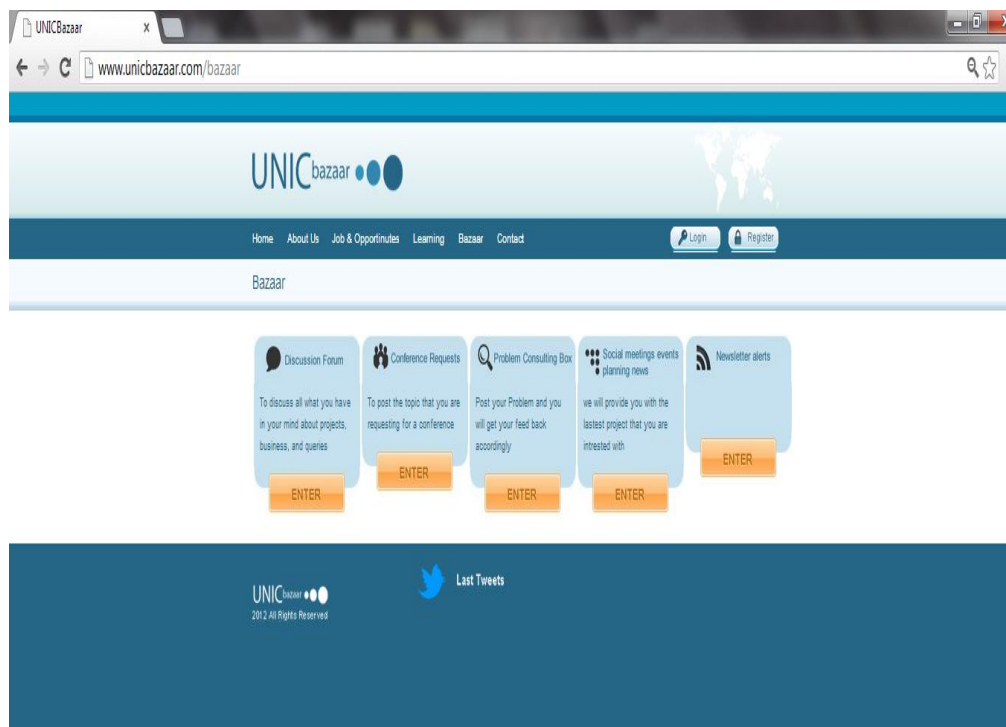
The services are:

- Online discussion room: provides online chatting media for the online users of the website, when users become online, they can communicate with each other through the chat rooms that are provided in this service with other online users.
- Conference Request: user will post his/her request for a conference with the details of the conference with the related topic waiting for further collaboration.
- Problem consulting box: its asynchronous service provided by the Bazaar project, in which users of the bazaar will post their consulting query and their particular problem in the problem consulting box in an aim to get the required consulting feedback from those who are ready to provide consulting services.

- RSS service: this service will provide conjunction with the newest project calls posted on the granting agencies website. When any party proposes an interesting project by the user, the news will pop up on the user's screen right on that time.



**Figure 35:** The Flow of Process of Bazaar



**Figure 36:** An illustration of Bazaar Page



## 3.2 THE WEBSITE USERS (AUDIENCES )

### 3.2.1 REGISTRATION PROCESS IN THE UNICBazaar

UNICBazaar requires existing and potential members a corporate registration (with their universities or firms identities)

After the registration process is accomplished, users should login to the website and then the provided services will activate for the users to navigate freely.

As shown below in the Registration and Navigation flow graph

User enters the URL of the website to check the website

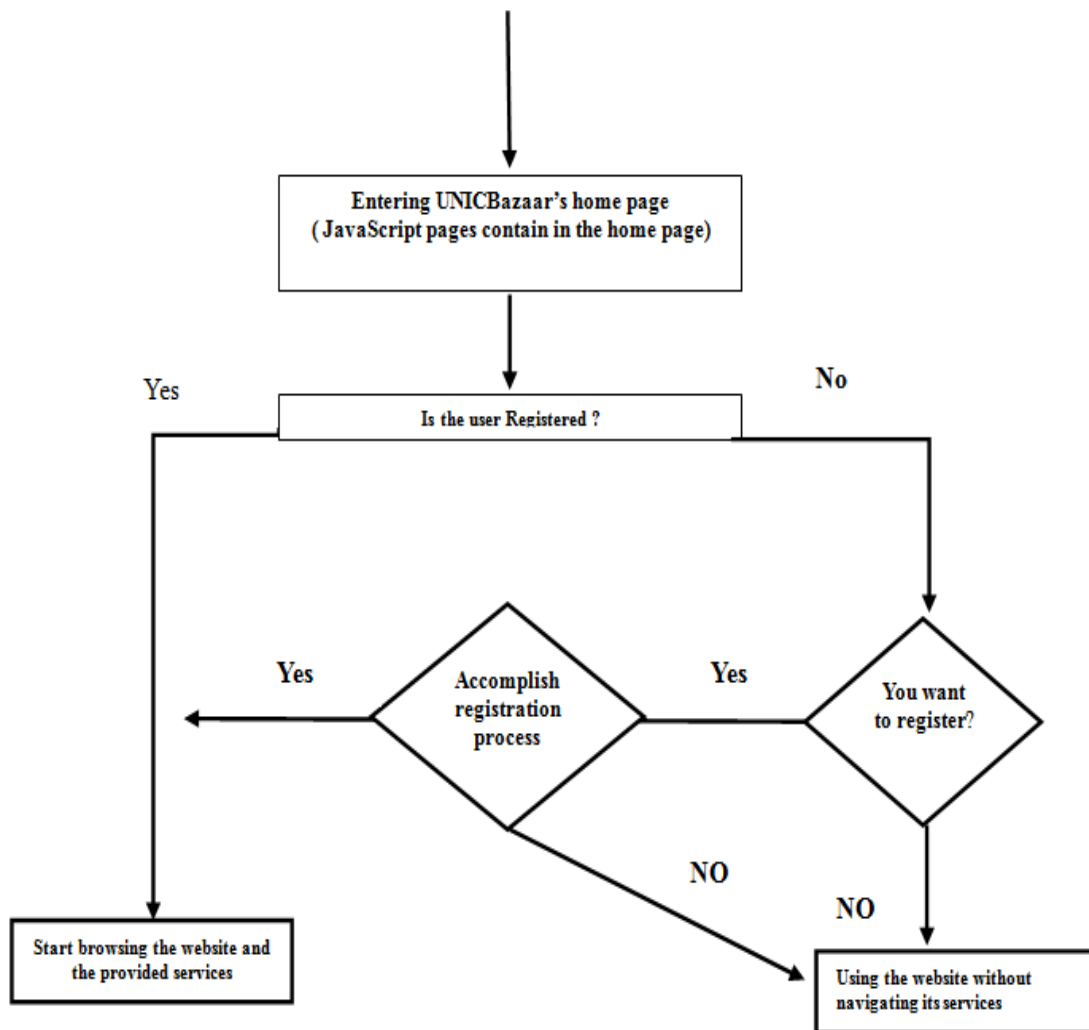


Figure 37: Registration and Navigation Flow Graph

When a user enters the website and loads the home page of UNICBazaar, in order to use the services of the website in its active status, the user needs to login , in case if the user is registered as a member in the website. Otherwise the user will need to register in the website in order to be able to be capable of using the website services, for registration the user needs to press on Registration button on the home page , the a list will appear ( which is shown below). the user will need to fill all the required information about him/her, these information are name, last name , father name, Email address, work description Which is required to be filled by the user to get a membership in the website :

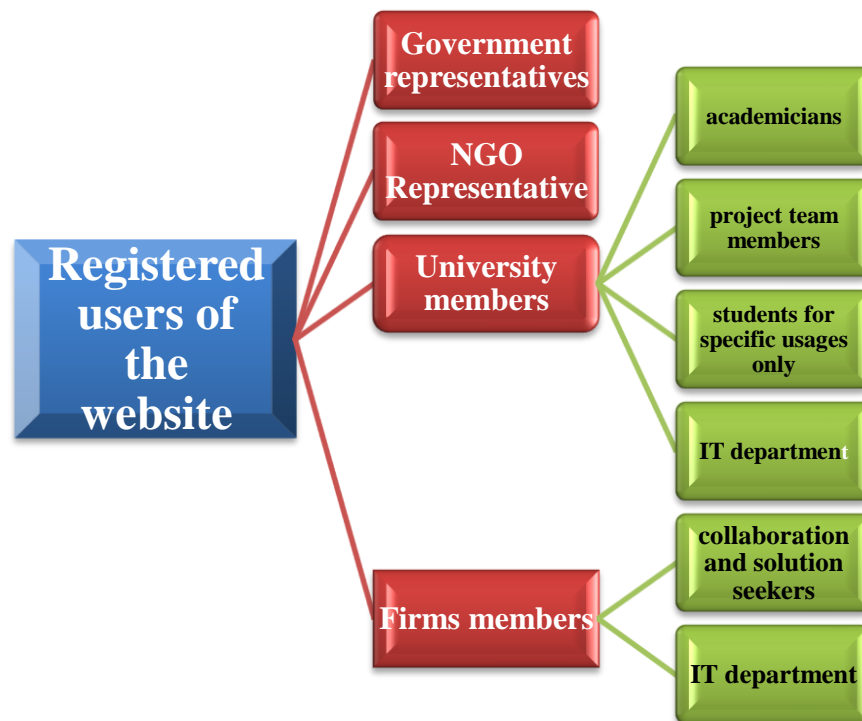
The screenshot shows the UNICbazaar website's registration page. At the top, there is a blue header with the UNICbazaar logo and a navigation menu with links for Home, About Us, Job & Opportinutes, Learning, Bazaar, and Contact. Below the header, there are two buttons: 'Login' and 'Register'. The main content area is titled 'Register' and contains a registration form with the following fields: Name, Last Name, E-Mail, Work Description, and Password. A 'Submit' button is located at the bottom of the form.

**Figure 38:** An Illustration to The Registration Page

### 3.2.2 REGISTERED USERS OF UNICBazaar

The registered users of the web site may be:

1. University members ( academicians, research assistants , potential or ongoing project team members , students may also be able to use the website for different but limited purposes including enrolment to summer training programs and work as collaboration project assistants .they want to enrol in summer training programs provided by listed firms in the website, project centres members who are interested in the offered projects by( EU, TUBITAK, firms and universities )
2. Firms members ( including IT experts)
3. Government representatives that would like to contribute different site processes
4. Representatives of the NGOs that are volunteer to collaborate in different processes



**Figure 39:** The Registered Users of the Website

### 3.3 THE SEARCHING ALGORITHM OF THE UNICBazaar

The Searching algorithm of the UNICBazaar is designed to find the given queries of the potential registered users of the website according to:

The algorithm of the searching engine (ASE) is:

$P_b = \sum_{a \in A} Y_{a,b}$  : total potential queries issued by all the users (registered, with respect that non-registered is equal to 1)

We are going to assume that (A is the set of all users) and (B is the set of all potential possible Queries)

In assumption that ( $a \in A$  and  $b \in B$ ) and

$Y_{a,b}$  Is the possible number of potential query by the registered user (assuming the query of non-registered user's query is equal to 1)

$L_a$  = set of possible web pages queried by the users

$H_a$  = set of possible Keywords queried by the users in the database of the system

Given the equation:

$$\{M_b\}_b \in B$$

ASE may rank the requested queries in decreasing order in B.

And if we assumed that the query  $B_M$  = initial M ranked queries in the searching process which contains the Top – M searches of the registered users

In case  $P_b(\sum_{a \in A} Y_{a,b}) >$  threshold then the engine will fetch the information from  $L_a$  and  $H_a$  by matching the keywords

### 3.4 THE ROLES OF UNICBazaar ADMIN

In order to provide the users of the website with satisfaction and ensuring that the website is user-friendly used by the users, the web administrator will manage the website content continuously through Managing Website content, the admin will:

- Identifying the website content and organize the documents
- Organising and manage the accounts of the registered users
- Organising and filter uploaded documents
- Identifying the required information and data to be uploaded to the website based on the demands that will be posted in the web
- checking and analysing the website content on a timely basis and make sure that the provided links on the website are active, maintaining website and check the troubleshoots in order to increase the performance of the provided services and the system as an overall
- authorized to grant login permission for the overall system and activating and deactivating accounts for all the members of the system
- maintaining the website and the HTML and JavaScript content of the website when required
- checking the feedbacks of the users on daily bases and providing the users with the required feedbacks. These processes will perform on two administrative stages, the first stage, implemented by the main administrator of the website, who will have an overall and solo control on the website and its content. The participant party's administrator implements the second administrative stage, which will include modifying and updating the accounts information of the users. The main administrator of the website will provide the information technology (IT) department representative of the university or the firm member in the website with an account (user ID) and password to become an administrator on the accounts of their organisation's members. The administrator will become able to organising, filtering, updating their members' accounts and information, activating, and deactivating the accounts of their members when is required.

### **3.5 THE POTENTIAL GAIN OF THE WEBSITE AND THE CONTRIBUTION THAT IT PROVIDES TO THE USERS (EXPECTED OUTCOMES OF THE WEBSITE)**

1. Job application opportunities both university/firms
2. Project application opportunities, team formation opportunities
3. Technical, social consulting
4. Training
5. Student training
6. Better recognition of registered members
7. Increased communication between firm & university members
8. Helping to locate laboratories when is needed by firms
9. Increasing laboratories usage
10. Increasing data sharing
11. Increased socialization options, problem sharing forums
12. Better creativity

## **CHAPTER VI**

### **MATERIALS**

#### **Introduction**

“Knowledge is power” said by Sir Francis Bacon in the sixteenth century in a reference to importance of knowledge and how does Knowledge plays an important role in controlling the power (Barabba, 1995). As we Previously mentioned in chapter one and chapter two that knowledge takes 2 forms, explicit and tacit, that is an important cornerstone for the permanence, continuity and the success of organisational activities and since knowledge is a sources of temptation for organisations and it is a necessity for every organisation to fulfil their organisational objectives. Since organisations are in a continuous quest for collecting and generating new and efficient knowledge and information to be used, embedded and adapted with the current technological development. By time, Knowledge will accumulate anywhere. Within organisations, within the collaborations of the organisations with others, in university and industry partnerships (that emerges according to the requirements and needs of the both parties for new technology, knowledge and information), joint Research and development (R&D), etc (regarding to the fact that this process specifically contains knowledge transfer and knowledge exchange processes). Accumulated knowledge is required to be managed, refined through set of processes known as Knowledge management (William R. King, 2009). in which knowledge management cycle initially starts with knowledge identification ,acquisition , development, distribution ( dissemination, sharing) , use , store and finally evaluation of the existing knowledge for providing feedback to define the objectives of the knowledge( Probst et al , 1999). With referring to Nonaka’s and Takeuchi’s description for KM as the organisational capabilities to do all knowledge-related activities and embody it with the organisational system dynamically and spirally through applying SECI Model in knowledge conversion. (Nonaka & Takeuchi, 1995).

With the development of knowledge management theories, technology and technological development started to take and play an important role in facilitating and managing knowledge and as an important tool for knowledge transfer (ISRC, 1998). The development of KM may observe through the encouragement of the academicians on involving technology as a tool in KM and its stages, accordingly, information technology (IT) and its channels started to become a KM facilitator starting with knowledge creation, identification, storing, dissemination and ending with utilizing and exploiting knowledge. ((Drucker, 1965) (Nonaka & Takeuchi, 1995) (Pursak & Daveport, 1997) (Dixon, 2000)). The channels that are used for knowledge management varies between non-computer based and computer based, which is seen mostly in the dissemination and knowledge transfer process. Carpenter argues that the effectiveness of knowledge dissemination increases when a combination of different channels (computer based and non-computer based channels) are used in the dissemination process. -e.g., demonstrating and publishing publications, articles and books via websites and achieving person-to-person meetings( formal and non-formal meetings) through social and electronic communication internet based tools ( such as Skype).( Carpenter et al,2005). The best illustration for knowledge exchange and knowledge dissemination can seen in the collaborations between parties (which is the case of our research with focusing on knowledge dissemination process), as in the university – industry partnership for further illustration we are going to exhibit some of the cases( as shown in table 4 below).



	<b>Project</b>	<b>Partners</b>	<b>Description and aims</b>	<b>Outcomes</b>
<b>Case 1</b>	ATC21S ( Assessment and teaching of 21 <sup>st</sup> century skills )	Microsoft, Intel , Cisco and university of Melbourne in 2008	The partnership emerged for shaping the skills of the university students to be compatible with the technological development and firms' requirements.	because of the success of the program, result of the collaboration launched in many universities and schools in an aim to develop the skills of the students
<b>Case 2</b>	TUM Research centre	Audi Company, technical university of Munich (TUM)	The collaboration included 100 PHD students majoring in technological issues to find solutions to help Audi's Production.	Steadily reflected the technological findings to the production lines that positively impacted on the competitive edge of Audi.
<b>Case 3</b>	Binnig and Rohrer Nanotechnology Centre	IBM and ETH Zurich	Collaborated in generating and exchanging Nanotechnology-related scientific knowledge and researching on the basis of Nanotechnology-related devices.	generating new Nanotechnology-Related knowledge the students started to visualize and envisage the how is work with industry through the partnership

<b>Case4</b>	Nokia from Product Company to service focused company	Nokia , Aalto University	collaborated to develop wireless, communication and multimedia technologies	large number of knowledge was transferred to Nokia from Aalto university
<b>Case5</b>	Traffic work	traffic engineering department of UC Berkeley's university and Nokia	Collaborate on a mobile application to simplify the road usage while there are traffic jams	Produced a mobile application that collects roads data and information from the people whom are driving with GPS systems, according to the collected data from the people and analysing the collected data accurate predictions of traffic jams in real time achieved since the GPS data is more accurate.
<b>Case6</b>	HUB portal	Tufts University and pharmaceutical companies	Aims to create interactivity among pharmaceutical companies and Tuft via collaborative portal	ensured interactivity between Tufts Pharmaceutical Companies innovatively via creating communication channels among researches and business development collaborations and make the university's discoveries and expertise in available for development through the web medium

**Table1:** Collaborative Cases between Universities and Firms

Since universities and industry members are in a continuous quest for finding the required information for their organisations Leydesdorff and Etzkowitz suggested that the scientific information's impact has increased on the organisational activities and

more scientific knowledge are produced through collaborations. ( Leydesdorff and Etzkowitz(1996). Additionally, Lee and Bozeman(2005) and Katz and Hicks (1997) mentioned in their researches that the productivity of researchers that take part of collaborative and partnership activities has increased significantly in terms of publications compared with those who didn't participated in collaborations. In the research that was accomplished on measuring the 'effects of university- industry collaborations on the scientific publication in Canada ( from 1980 until 2005)' by OST and CIRST , the research showed that the number of articles that was published increased from 12.867 to 27.597 and publications from 17.000 to over 32.000 . The number of firms that participated in collaboration and contributed in producing scientific knowledge increased from 872 firms to 1.691. Universities and industry members started collaborating in USA since the late of 19<sup>th</sup> century and contributed in solving the problems of the industry. The number of the partnerships is significantly increasing that kept pace with the technological development, with regards that to the contribution to both parties that included solving industry's problems and transferring knowledge to both party members through offering strong trainings to the students. (Mowery, David C, Sampat, Bhaven N, 2004). Marwick (2001) confirmed that in order to get efficient knowledge management solutions, a suitable combination between organisational initiatives and technologies (such as web-based tools, video conferences, chat tools and web-based knowledge portals, etc) for knowledge dissemination should take place. Kock, Auspitz and King reviewed that the involvement of web-based technologies in knowledge management and collaborations will assort the dissemination process and reduce the required time to achieve the dissemination process (Kock, Austpiz, King, 2000).<sup>[52]</sup> As we mentioned in chapter two that portals are systems designed to obtain robust, durable, adjustable, able to be customized and personalized and an integrated approachability to a various formats of stored information in a distributed sources (repository) when it is needed.

The principal purpose of the thesis is to assess knowledge dissemination process by using a web portal among the collaborative parties since knowledge management become an essential component in creating identifying, organisation, and modifying the

used information the organisations and the organisational activities. Moreover, since knowledge management with its stages has a primary impact on the flow of the required information (in its explicit form) in the organisations. Additionally, since Knowledge management perspective of knowledge varies between explicit and tacit knowledge as argued in chapter one and chapter two, which are the fundamental notions of knowledge, with reference that the explicit knowledge is easily stored, transferred and used in the organisations (Wilson 2002).

## METHODOLOGY

I conducted a literature review, similar to the ones that were achieved in other similar thesis and I could not detect a significant empirical model that I can use to frame this thesis. Others have used literature reviews, charts or decision-tree models abroad that I thought that they were not suitable for this thesis due to the fact that the state of the relationship is a multi-dimensional issue which includes:

- Internal and external environment of both parties , and legal issues
- People’s perception of the collaboration
- Data privacy issues
- Promotion of collaboration
- Corporate cultures

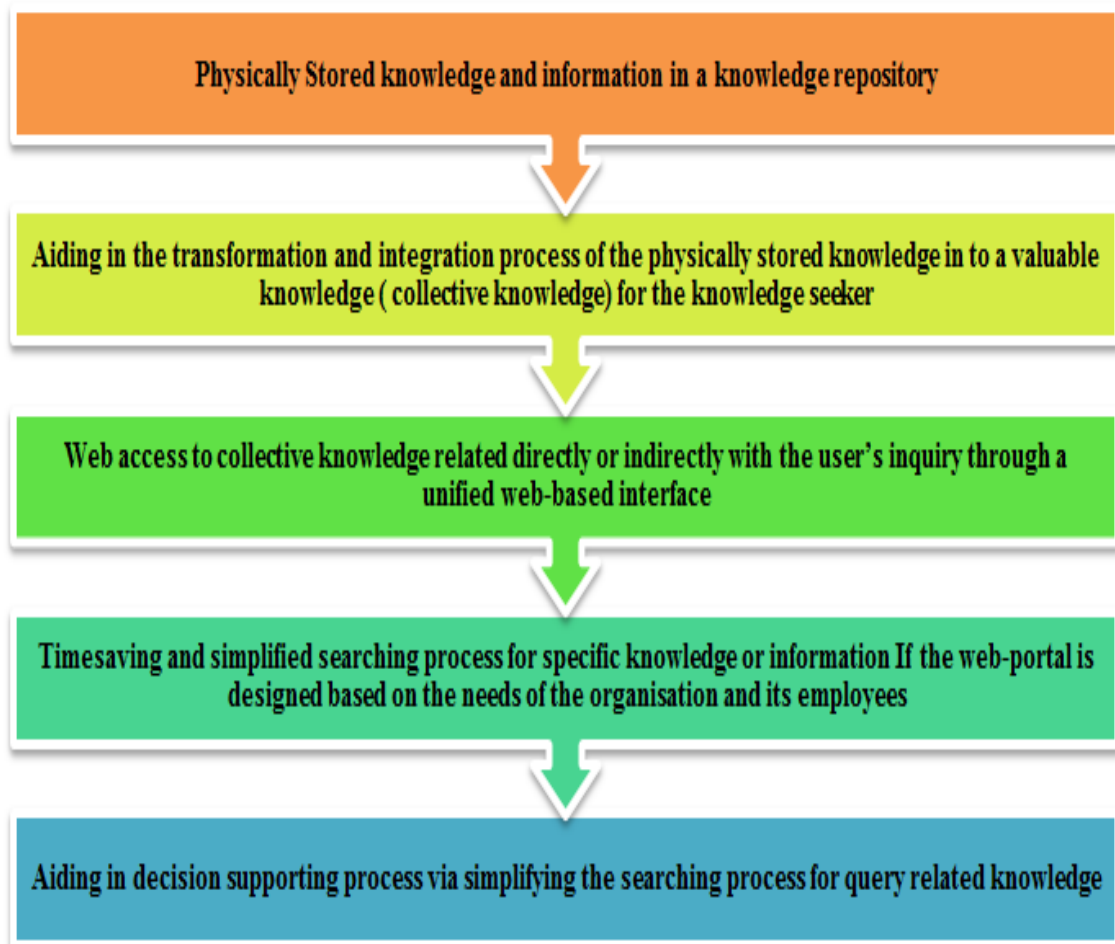
So adopting the literature seemed as a constraint, we reached this result in our pre-research before the thesis. So we thought to create something new, did not adopt different projects results due to the factors we mentioned above. Therefore, as the basic method we concentrated on web-design. Based on a deep literature review and the analysis of mentioned below related empirical studies and that we conducted from April to December 2012 of:

<b>1. Knowledge management</b>	<b>2. University industry collaboration cases</b>
<b>3. Knowledge management theories</b>	<b>4. University industry collaborative tools</b>
<b>5. Knowledge management stages</b>	<b>6. University industry collaborative web- based tools</b>
<b>7. The impact of technology on knowledge management</b>	<b>8. knowledge platform</b>
<b>9. Knowledge dissemination</b>	<b>10. Knowledge dissemination platform</b>
<b>11. University industry collaboration</b>	<b>12. Efficiency of web-based tools in knowledge dissemination and R&amp;D</b>

**Table2:** Conducted Literature Review and Related Empirical Studies

We found that web-based portals and virtual platforms providing a collective knowledge to the knowledge seekers when is required within and without collaborations through single web-based portal. Portals are designed to find solutions to get through organisational problems by capturing through the dissemination process the required collective knowledge via web-based portals as a solution and assisting to capture the required knowledge for integrating knowledge in to and within organisations by transforming the collectively captured knowledge in to its valuable form.

Portals provide:



**Figure 40:** Provided Services by Portals

We basically concentrated on the “dissemination “part of the classical knowledge management theory as the method and we also selected Nonaka’s SECI model ,since dissemination process is a dynamic process in the collaboration process and knowledge

dissemination and exchange. to be able to optimize the effects of the dissemination process in collaborations between university and industry, starting with enhancing a better collaborative interaction between the parties, efficient transfer for the required services and information, and ending with minimizing the time consuming through knowledge transfer and the scarcity of required knowledge and information for the collaborative parties.

Capturing and creating knowledge processes within the two parties occur via dynamic processes (SECI) by collecting the tacit knowledge and transforming it to explicit knowledge spirally. Since the two parties are in a need for each other's accumulated knowledge. Through the researching process:

- We selected 103 official websites of the state universities that are listed in the commission for the higher education in turkey (YOK) (<https://www.yok.gov.tr/content/view/531>). In an aim to check and examine the collaboration process with industry members and provided portals for university industry collaboration, we did not find any portal or a web-based collaborative tool used in collaborations or used to help in establishing collaborations. (Expect Ege University Industry Services Office (EBİLTEM) ([www.sho.ege.edu.tr/sho.php](http://www.sho.ege.edu.tr/sho.php)) that provides web-based search on academics, project ideas for thesis students). Since universities are the parties that supply industry with raw data and theoretical data and practical knowledge that is required by the industry or any other party.
- Then we searched the internet for portals (listed in table 2 below) that have a similar approach and a direct and indirect aid in the collaboration between universities and industry members(targeted the same audience from university, industry, job seekers, knowledge and information seekers, partnership and

collaboration seekers are) and we selected 38 portal. We selected, inspected and generally analyzed these portals according to:

1. Provided services , content and the flow of knowledge transfer with the provided services
2. Targeted audiences ( concentrated on university , industry separately and collectively )
3. Structure of the disseminated knowledge
4. Technical design of the platforms
5. Rational design of the platforms
6. General perception of the flow of services within the portals to the targeted audiences
7. Accessibility features of the web-based portals and searching engines

1. Webair.in jobs portal( <a href="http://webair.in/jobs/tag/marketing-jobs/">http://webair.in/jobs/tag/marketing-jobs/</a> )
2. University of Limerick ( <a href="http://www.ul.ie/portal">http://www.ul.ie/portal</a> )
3. Research council of UK / Knowledge transfer portal ( <a href="http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx">http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx</a> )
4. BASECAMP ( <a href="http://basecamp.com/">http://basecamp.com/</a> )
5. Red Prairie( <a href="http://www.redprairie.co.uk/">http://www.redprairie.co.uk/</a> )
6. JDA/ the supply chain company ( <a href="http://www.jda.com/">http://www.jda.com/</a> )
7. Faba Soft /folio cloud ( <a href="http://www.foliocloud.com/">http://www.foliocloud.com/</a> )
8. UNINETT ( <a href="https://www.uninett.no/en/collaborative-portal">https://www.uninett.no/en/collaborative-portal</a> )
9. AGORA Systems ( <a href="http://www.agora-2000.com/">http://www.agora-2000.com/</a> )
10. Structured Organic Particulate systems / an engineering research center ( <a href="http://ercforsops.org/">http://ercforsops.org/</a> )
11. Hall ( <a href="https://hall.com/">https://hall.com/</a> )
12. CoreSHILED ( <a href="http://www.coreshield.org/">http://www.coreshield.org/</a> )
13. Bisque database ( <a href="http://bovary.iplantcollaborative.org/client_service/">http://bovary.iplantcollaborative.org/client_service/</a> )
14. VMware Zimbra ( <a href="http://www.zimbra.com/">http://www.zimbra.com/</a> )
15. EGROUWARE ( <a href="http://www.egroupware.org/">http://www.egroupware.org/</a> )
16. SCALIX / Xandros Company ( <a href="http://www.scalix.com/">http://www.scalix.com/</a> )



17. Webair.in jobs portal( <a href="http://webair.in/jobs/tag/marketing-jobs/">http://webair.in/jobs/tag/marketing-jobs/</a> )
18. University of Limerick ( <a href="http://www.ul.ie/portal">http://www.ul.ie/portal</a> )
19. Research council of UK / Knowledge transfer portal ( <a href="http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx">http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx</a> )
20. BASECAMP ( <a href="http://basecamp.com/">http://basecamp.com/</a> )
21. Red Prairie( <a href="http://www.redprairie.co.uk/">http://www.redprairie.co.uk/</a> )
22. JDA/ the supply chain company ( <a href="http://www.jda.com/">http://www.jda.com/</a> )
23. Faba Soft /folio cloud ( <a href="http://www.foliocloud.com/">http://www.foliocloud.com/</a> )
24. UNINETT ( <a href="https://www.uninett.no/en/collaborative-portal">https://www.uninett.no/en/collaborative-portal</a> )
25. AGORA Systems ( <a href="http://www.agora-2000.com/">http://www.agora-2000.com/</a> )
26. Structured Organic Particulate systems / an engineering research center ( <a href="http://ercforsops.org/">http://ercforsops.org/</a> )
27. Hall ( <a href="https://hall.com/">https://hall.com/</a> )
28. CoreSHILED ( <a href="http://www.coreshield.org/">http://www.coreshield.org/</a> )
29. Bisque database ( <a href="http://bovary.iplantcollaborative.org/client_service/">http://bovary.iplantcollaborative.org/client_service/</a> )
30. VMware Zimbra ( <a href="http://www.zimbra.com/">http://www.zimbra.com/</a> )
31. EGROUWARE ( <a href="http://www.egroupware.org/">http://www.egroupware.org/</a> )
32. SCALIX / Xandros Company ( <a href="http://www.scalix.com/">http://www.scalix.com/</a> )
33. Webair.in jobs portal( <a href="http://webair.in/jobs/tag/marketing-jobs/">http://webair.in/jobs/tag/marketing-jobs/</a> )
34. University of Limerick ( <a href="http://www.ul.ie/portal">http://www.ul.ie/portal</a> )
35. Research council of UK / Knowledge transfer portal ( <a href="http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx">http://www.rcuk.ac.uk/kei/ktportal/Pages/home.aspx</a> )
36. BASECAMP ( <a href="http://basecamp.com/">http://basecamp.com/</a> )
37. The corporate site for Scotland's tourism organisation <a href="http://www.visitscotland.org/">http://www.visitscotland.org/</a>
38. Expect Ege University Industry Services Office (EBİLTEM) <a href="http://www.sho.ege.edu.tr/sho.php">www.sho.ege.edu.tr/sho.php</a>

**Table3:** The Portals and Websites Selected for This Study

- Additionally to the deep litterateur review, we analyzed and inspected empirical studies, researches and analyzes related directly and indirectly with applying web-based portals in collaborations and knowledge transfer processes ( shown in table 3)

Krasniqi & Persson ,(2012)	Web-based Knowledge Portals in Swedish Healthcare-Overview and Challenges
Neumann, O'Murchu, Breslin, Decker, Hogan & Macdonail ,(2005)	Semantic social network portal for collaborative online communities
Kock, Auspitz and King ,( 2000)	Using the Web to Enable Industry-university collaboration: An Action Research Study of a Course Partnership
Norwegian Agency for Quality Assurance in education (NOKUT) , (2005)	Web-based collaboration platform technological imposition or effective tool?
Lapina & Slaidins ,(2005)	Innovation Oriented university-Industry Collaboration Models in Electronic Engineering
Kondratova , Goldfarb, (2004)	Knowledge Portals As a New Paradigm for Scientific publishing and collaboration
Lee, C.S., Goh, D.H and Chua, A., (2010)	An Analysis of Knowledge Management Mechanisms in Healthcare Portals
Lee, Goh, Chua and Luyt, (2007)	Knowledge access, creation and transfer in e-government portals
UNECE International Conference, Telles,(2010)	Knowledge Intensive Organizations Managing Innovation and Collaboration
Pascal A. et Thomas C.,(2007)	"Designing an ICT solution for a multi-actor environment: the KMP experimentation"

**Table4:** Empirical Studies, Researches & Studies and Analyzes about Knowledge Management Platforms and Collaborations between University and Industry.

Based on the studies that we mentioned above in table 1, 2, 3, and since the knowledge dissemination process is a dynamic process (based on Nonaka's SECI model) through collaborations

## **THE FRAMEWORK**

We reached to a general design for a virtual web- based portal that expect to enhance and to facilitate the collaboration between university and industry and manage the collaboration processes and the knowledge transfer process in eight steps:

- Step 1: we designed a website and we named it UNIC Bazaar (that extends for university industry collaborative bazaar) that will be used a medium among the -potential collaboration seekers.
- Step 2: we defined the targeted audiences' (users) dimensions of our website's that are university members, industry members, government and non-governmental organisations (NGOs) representatives (as explained in (3.2)).
- Step 3: we defined the provided services for potential parties' members that enhance the knowledge transfer, exchange process and potential collaboration, feedbacks among the members and recruitment process by the tools (synchronous and asynchronous, searching engine for required data, online chat room, mail services ) of the UNIC bazaar.
- Step 4: we designed a general algorithm for the searching engine of the UNIC bazaar (as explained in section 3.3).
- Step 5: we designed the flow of the information and the web- content based on the type of services and information that potentially will be beneficial for the members.

- Step 6: we designed the data warehouse of the website and the way that data will be stored( as explained in (3.1.3))
- Step 7: we defined the required managerial roles of the web- admin for administrating collaborations, web content, web services and providing feedbacks to the users when it is required(as explained ( 3.4)).
- Step 8: we defined the managerial roles of the representatives of the participated (member) institution (organisation) in the website and the limitation of their roles.
- Step 9: in a comparison with the inspected portals through the researching process and their outcomes, the overall knowledge dissemination and technology transfer process via virtual knowledge dissemination platform(UNICBazaar) designed to solve the common problems of the collaborations in an aim to achieve certain outcomes.( section 3.5).

We came with a general frame for a searching algorithm to cover all the potential searching possibilities when a potential search is launched through our website:

The Searching algorithm of the UNICBazaær is designed to find the given queries of the potential registered users of the website according to:

The algorithm of the searching engine (ASE) is:

$P_b = \sum_a \in A Y_{a,b}$  : total potential queries issued by all the users (registered, with respect that non-registered is equal to 1)

We are going to assume that (A is the set of all users) and (B is the set of all potential possible Queries)

In a assumption that ( $a \in A$  and  $b \in B$ ) and

$Y_{a,b}$  Is the possible number of potential query by the registered user (assuming the query of non-registered user's query is equal to 1)

$L_a$  = set of possible web pages queried by the users

$H_a$  = set of possible Keywords queried by the users in the database of the system

Given the equation:

$\{M_b\}_b \in B$

ASE may rank the requested queries in decreasing order in B.

And if we assumed that the query  $B_M$  = initial M ranked queries in the searching process which contains the Top – M searches of the registered users

In case  $P_b (\sum_a \in A Y_{a,b}) >$  threshold then the engine will fetch the information from  $L_a$  and  $H_a$  by matching the keywords

## CHAPTER V

### 5.1 DEFINITION OF THE POTENTIAL OUTCOMES

Based on the literature reviews, related empirical studies, analyses, and the current collaboration situation in turkey the expected potential outcomes of applying the UNICBazaar as a knowledge dissemination and technology transfer medium between the universities, industry members and students are as follow:

<b>Expected primary outcomes(Short-term)</b>	<b>Industry</b>	<b>University</b>
Transfer of Accumulated Knowledge (Know-how, Know-why)	X	X
Increase in Academic Outputs( Articles, Books, Innovations, Patents ,etc)		X
Increase in Research and Development( R & D) activities	X	X
Finding solutions ( scientific & academic) for industry related problems( Access to industry related problems' academic solutions)	X	
Providing consultancy services	X	X
New opportunities for joint researches	X	X
Transfer of accumulated knowledge and expertise through the training courses, conferences, workshops and collaborations	X	X
New opportunities for the graduates employment		X
Access to potential funding for researching		X

<b>Expected secondary outcomes(Long-term)</b>	<b>Industry</b>	<b>University</b>
New horizons in cooperation and collaborations	X	X
New experiences and improvement in researching capabilities	X	X
opportunities for expertise mobility (staff mobilizations between both parties)	X	X

## **5.2 THE CONTRIBUTION OF THE SYSTEM ON FILLING THE GAP**

Despite the limitations of budgetary and administrative constraints in case of applying the system and the establishment of the portal, regarding the lack of applied coordination and communication between universities and industry members the system will:

1. UNICBazaar will contribute (directly and indirectly) to enhance and simplify the duality of communication process between the two parties' members (as in collaborations, joint researching and R&D). The system will consolidate the collaboration concentrated communication process on the web site.
2. The system will improve the coordination between the two parties, since the system works via internet. Here, the UNICBazaar is expected to work better for the organisation that are using mostly using computer infrastructure for their administrative operations and the universities for their daily activities. Assuming that the parties are interacting via and using web-based and internet-based mediums during the activities stated, this may also mean that they have the necessary IT infrastructure to handle UNICBazaar transactions.
3. The system will contribute to increase the demand (for both parties) on the required applicable industry-related academic output.
4. It will aid in nurturing, refining, cultivating and providing a suitability to the generation of new and creative ideas that needs guiding for innovation.
5. It will provide a better recognition for academic and institutional expertise both by universities and industry
6. Breaking the ice for those who want consulting services from both parties' members, by getting direct feedbacks through the communication tools that exist in the website

### **5.3 ADMINISTRATION OF THE SYSTEM AND THE PROPER management tips**

In order for the system to work properly, the system should be administrated and managed, accordingly, we identified the idea and vision of UNICBazaar that is to create an efficient, effective and simplified communication between the collaborative parties via transferring selected non-computer based dissemination channels to computer based ones through a web-based platform. In addition, we identified the goals, objectives, sub objectives and expected potential outcomes of applying the system. Firstly, we will need to institutionalize the project through establishing an organisation for managing the project. Secondly, we need to perform estimation for the overall required operational budget for the system in a year. For that reason, we interviewed many experts who deal with designing and operating websites and portals to have a general idea about the financial requirements for the system. They recommended that in order to operate the system and collect part of the required operational budget a tuition fee should charge to the participants and to the potential events that may organize through the web services as in conferences, workshops, seminars and training courses. Additionally, investors and fund raising events and sponsorships can play a substantial role in funding the project. Finally, in case of applying the system, list of directions will issue for the in charge mangers (the representatives) in the collaborative parties, as in providing updates about their participants, publications, etc.



## CONCLUSION

A multidisciplinary and gradually increasing interaction between universities and industry members have seen lately over the past decade; the interaction between the parties (universities and firms) varied between joint- Research and development (R&D), collaborative researching on industry-related problem funded by the industry(to encourage both academia and industry to work together for a common good), and technology transfer centres . Regarding to the facts, university is an important source of scientific R & D knowledge and solutions for vital problems of the society; interaction process involves knowledge transfer process between the collaborative parties and their stakeholders (as any activity in the society cooperation). Finally, collaborations should abreast with the technological development through their implementation and there is a lack of web-based university-industry collaboration. The deployment of web-based tools through the collaborations among the parties turned to become the most common trend globally in the last decades, since each party's experiences shared in a real-time action among partners. Best illustration for combing IT tools in the collaborations can see in the collaboration of MIT with Microsoft. IBM&UT, ATC21S ,the HUB experience, the hathitrust and the DZI and KPU collaborations for developing students' intellectual skills through applying web-based tools in the collaborations in USA with reference to NOKTU's(the Norwegian agency for Quality Assurance in Education) report on the importance of applying web-based tools in the collaborations between universities and industry members. Using web-based tools in the collaborations turned to a necessity when the web- medium is designed according to the need of facilitating the collaboration and knowledge dissemination process. Comparing with turkey, in the last decade collaboration projects between university and industry

become more popular in turkey, with references to the constraints (such as cultural interactions) that kept the collaboration in a primitive level.

After the year 2000, Turkey started to involve in the collaboration with the university in order to make a regional development, on the other hand, universities started to aware that collaboration with industry is important for collecting funds (monetary reasons) that was the milestone of shaping the collaborations. The collaborations have perceived in terms of monetary support and the establishment of technology centres with referring that there are 28 technology transfer centres until the year 2010 and it is gradually increasing. As we mentioned in the literature review, countries such as USA, EU, UK, Albania, Canada, Japan, Latvia examples of using web-based knowledge dissemination channels emphasized on the direct and the indirect application of information technology to the communication process in the collaborations that accompanied the emerging of the collaboration importance awareness among the universities and the firms. These countries emphasized on this process for the reasons of making the collaboration and communication process easier, faster and strengthening the accessibility for more information as solution for enhancing the knowledge transfer process. Moreover, since these countries found that using web-based and IT tools in the collaborations as a facilitator, why don't we apply it to turkey to make the knowledge exchanging process faster among the collaborators in turkey since only few universities are using their own websites as a medium for offering collaboration and researching opportunities?

First, we came with an idea of developing a system that works as a portal and as an interface between the collaborative parties in turkey, in an aim to make the knowledge transfer easier, faster, efficient and effective, since it was applied in the previously mentioned countries as a solution for knowledge dissemination process. We designed a website (and named it UNICBazaar) based on the most required services by universities (including academicians, students), by the firms and by those whom are in search for potential researches and collaborations and away from all the required paper works and on the office hours meetings that take place in the collaborations.

Second, we provided UNICBazaar with all the Asynchronous tools, synchronous tools, tools to post the potentials collaboration proposals and requests, training offers and requests, seminar and work offers and requests, and a simplified searching engine that classifies all the required queries and solutions for managerial problems according to their documentation types. Additionally, a selective tools for providing an instant feedback among the collaborators, since feedback is an important element (when needed in a glance )for the success of the knowledge transfer process (which is an important Key success factor of collaborations) through the knowledge exchange process with the collaborations in a reason to take the cooperation to a further successful step.

Since our research gives an account to the reasons and the effects of applying web-based tools in collaboration, based on the previously mentioned experiences, cases, and examples the result of our research showed that the application of UNICBazaar as a facilitator will contribute to increase the potential transfer of accumulated knowledge between the collaborative parties, create a potential awareness on the demand of academic output, consulting services and R&D ( especially when it is industry based ones). On the other hand, increase the awareness of joint events that will contain a potential transfer for accumulated expertise, mobility of experiences on the personal and organisational level and bridging the gap between universities and industry members through adding simplicity to the communication by using developed, simplified, modified according to the needs knowledge dissemination channels through the collaborations. Nevertheless, using a web-based tool will help to minimize time consumption that is involved within the paper works through collaborations , since everything is stored, organised , managed , transferred and implemented through a web-based medium .

through our research we faced with constrains and limitations that needed to be addressed and acknowledge related to our research ,starting with the budgetary constraints for applying the system and for using it as an interface among the potential collaborative parties to measure the effects and the impacts of applying the system.

Ending with the second limitation, that is the time constraint. through the research we were obliged to implement a general design for the website and assess the effects of applying UNICBazaar with comparing it's applying to the dozens of examples that we chose almost from 10 countries and their experiences for developing their U-I relations. And since most of the articles and the documents about the university-industry collaborations in turkey are in Turkish language, it took lots of time for translating and analyzing their contents in order to have a holistic and substantial view about the U-I relations in turkey. We launched and implemented this study only in 8 months since we were constrained by time to finish this study in 8 months.

## **FUTURE WORKS & RESEARCH**

In a long-term application of the system, there are certain issues which need to be analyzed in more details. The first issue is about the budgetary constraints that will be faced by the system administration itself. The funding procedure of the system still remains a question since the infrastructure is expected to have high costs because of the system infrastructure.

To tackle with this, a membership fee can be proposed at preliminary stages of the project undertaking. However, it is obvious that a more detailed research is required in order to realize a financial management. Second issue is that a more deepened marketing activity can also be required in order to explain the benefits of the system during the membership registration.

To be able to deepen the market analysis, contact persons from both university and industry sides should be identified and a marketing team should be trained to express the positive changes that UNICBazaar expects to offer. In this context, establishment of long-term relations with the stakeholders seems as a challenge. Before institutionalizing the project, the steps below will achieve and implement for the success of the project, a pilot study can be conducted including the following steps:

- Firstly, we are going to select twenty five state universities in different regions that are currently working on research and development (R&D) and knowledge transfer processes from different sectors of the industry. We will analyze their readiness for applying the project and determine the barriers that hinder technology transfer process through launching survey and in-depth interviews with the participants from the universities. Delphi method can be a useful solution in this stage.
- Secondly, we are going to select twenty-five companies from different sectors (according to Standard industrial classification) and we will measure their readiness for applying the project and the obstacles that face the firms when potential technologies transfer process. The obstacles may also be measured at the area of potential collaboration or consulting services is needed. This can gain be done through launching survey and in-depth interviews with the potential members.
- Thirdly, after analyzing the main components of the ontology design requirements that fit with each sector member separately, certain modifications on the website and system infrastructure design can be made. During these changes, certain representatives from both sides can be included in the process since, we have to consider current system and utilization knowledge state prevalent in the university and industry. For instance, designing alternative communication interfaces (to be used by universities and firms that are working in the same domain and/or the universities that are researching in a specific filed with the potential industry members clustered at the same/peripheral domains) can be assumed as a preliminary modification in the system. In this way, the knowledge transfer process will be more precise and specific according to each party's filed.
- Alternatively, a refreshed marketing plan should also be formulized based on the findings of collected and analyzed data from the potential surveys and in-

depth interviews planned. Here, the reformulated marketing plans should solve the trust issues of the two parties with each other that is expected to be faced and a brand new marketing strategy may be targeted in order to induce potential members for participation.

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