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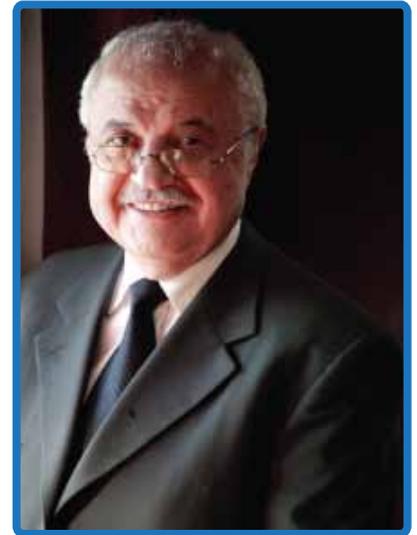
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## Contents:

Predicting Housing Price in Moroccan Cities Using Web Data .....	1
Remote Sensing for Real-time Early Warning of Environmental Disasters and WRF Modelling .....	11
FLOSS ERP Systems Usage in Developing Countries: Case Study of a Moroccan SME .....	18
The impact of the implementation of the ERP on end-user satisfaction Case of Moroccan companies .....	35
Creare Mediterraneus, searching the roots in a digital way .....	52



# Predicting Housing Price in Moroccan Cities Using Web Data

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**Abstract:** Web contents represent a rich source of data that contains various valuable information. These contents are usually formatted for human users. Consequently, this rises many challenges and makes the discovery and analysis of web data a difficult task. In particular, the extraction of data from the web requires an automatic browsing on the web pages in order to find, index and collect relevant contents. This paper presents an approach for gathering ads contents from web pages, and saving them in a structured form. The extracted information will be used for studying some economic markets in Morocco, especially real estate market. In fact, we predict the apartment's prices using time series with Autoregressive Integrated Moving Average (ARIMA) model.

**Keywords:** ARIMA model, Information extraction, Prediction, Time series, Web data, Web scraping.

## I. INTRODUCTION

The World Wide Web is an important and dynamic source of information which has attracted the attention of researchers from many areas. It is characterized by the diversity of distributed information sources and their heterogeneity.

Generally, the current web represents a huge amount of data available in unstructured form that is usually formatted for human users. This unstructured nature of contents presents many challenges and makes difficult to automate the extraction of pertinent information from various source [1, 2, 3, 4].

The analysis of data contained on the web requires first an automatic browsing on web pages in order to find and extract accurate contents. This extraction is typically performed by scrapers. The term scraper refers to a program that performs automatic access to World Wide Web resources in order to collect relevant contents from Web pages and present them in an appropriate format [3, 5].

The time series analysis is a statistical tool that allows investigating the behavior of time dependent data. It also predicts future values depending on the previously observed values. Autoregressive Integrated Moving Average (ARIMA) model is a method to study time series, and it is widely used to predict linear time series data [15].

In this paper, we focus on predicting housing price in four neighborhoods situated in different Moroccan cities. We have used web ads data related to each neighborhood to study the variation of housing prices. Thus, we can predict after that the approximate prices of sale in the future using ARIMA model.

The rest of the paper is organized as follows. Section II discusses information extraction from the Web. Section III describes Time Series analysis and forecasting. Section IV presents the experimental results. Finally, we conclude our paper in Section V.

## II. INFORMATION EXTRACTION FROM THE WEB

### A. Web scraping

Web scraping also known as web harvesting refers to a technique that aims extracting data from websites. Its basic principle is to transform unstructured data presented in web pages to structured data easily exploitable [6].

The extraction of information in a specified web site is typically performed by using a scraper. This program simulates human exploration of the World Wide Web by implementing requests using the HTTP (Hypertext Transfer Protocol) communication protocol. Generally, it is designed to look for specific types of contents in web pages, and then transform them into structured data that can be stored in an particular format such as XML or spreadsheet [6, 7].

There are many methods to scrap information from the Web. Human copy-paste is one way to export information from a Web page, but this is not feasible in practice especially when talking about a lot of Web pages. Text grepping is another method based on regular expressions to find contents that match some patterns. HTTP programming, DOM parsing and HTML parsers are other Web scraping techniques.

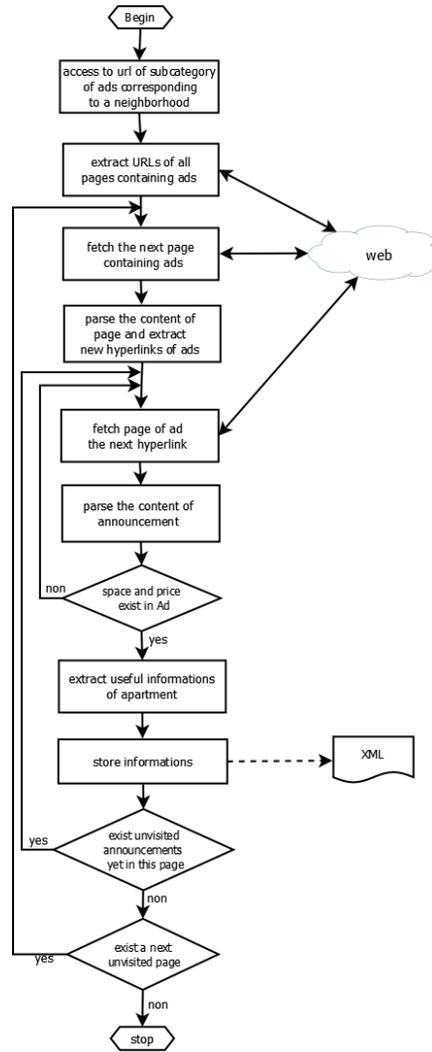
### B. Our scraper algorithm

In this work, we have implemented our own scraper for exploring automatically some Moroccan websites. It has been designed to perform the extraction of contents from ads and store them in a structured XML format. Our scraper relies on the following steps:

**Fetching**: To fetch pages, the scraper take the role of a Web client. It sends HTTP requests to the server hosting the pages and reads the responses. It has timeouts to avoid spending long time waiting for slow servers [8].

**Parsing**: Once a web page is fetched, the scraper parses its content based on Document Object Model (DOM) that defines the structure of an HTML page. It identifies tags and associated attribute-value pairs in order to locate and extract the useful data from each web page [9].

Generally, each web page contains a set of brief descriptions and links toward other web pages. The following flow chart describes the important steps of our scraper.



**Fig. 1.** Flow chart of our scraper algorithm.

As explained in the flow chart, the scraper starts from an URL corresponding to a given neighborhood. It performs the extraction of other URLs corresponding to the all pages containing a set of hyperlinks toward ads. For each ad, it extracts the useful information and saves them in XML format.

### III. TIME SERIES ANALYSIS AND PREDICTING

#### A. Time Series

In time series forecasting, the past observations of the same variable are analyzed to build a predictive model. The model is then used to forecast the time series into the future.

One of the most important time series model is called Autoregressive Integrated Moving Average (ARIMA) model [10].

**Definition of a time series:**

A time series is a sequence of observations, measured over successive times. It is mathematically defined as:

$X_1, X_2, \dots, X_n$  : set of n observations  
with  $X_t$  : observation at instant t

Each observation in the time series is treated as a random variable, and it is measured in a proper chronological order.

A time series containing observations of a single variable is termed as univariate and it is termed as multivariate if there are more than one variable [11].

**Components of a Time Series:**

The main components describing a time series are:

- Trend: the changes in growth or decay over a long term of the time series.
- Cycle: refers to the presence of some recurrence who can usually be observed in intervals of several years.
- Seasonal: the presence or absence of a periodic effect which relates to one year, semester or trimester...
- Irregular fluctuations: this characteristic of a time series is the unexplained part of the trend, the cycle or seasonality, the unpredictable influences of the rare events are often the cause of these fluctuations [12].

**B. ARIMA models**

ARIMA is a model that aims to perform the prediction of future evolution of a phenomenon over time. It is based on the use of time series, it seeks to determine each value  $Y_t$  in the series at the instant t based on the past observations and errors at the previous instants t-1, t-2, ... .

ARIMA is a generalization of an ARMA (Autoregressive moving-average model), the difference is that ARMA is applied only to stationary time series. Contrariwise, ARIMA model is suitable for non stationary time series. Generally, ARIMA model consist of the following models [13]:

**AutoRegressive (AR):**

It supposes the future realizations can be predicted based on the past values. Each observation consists of a random component and a linear combination of previous observations with the autoregressive coefficients.

The notation **AR(p)** indicates an autoregressive model of order p. It can be written as:

$$X_t = c + \sum_{i=1}^p \varphi_i X_{t-i} + \epsilon_t$$

$\varphi_{i=(1,2,\dots,p)}$

Where c is a constant,  $\varphi_i$  are the parameters of the model, and  $\epsilon_t$  is a random error [14].

### Moving-Average (MA):

It is built upon the assumption that error at instant  $t$  depends to the past errors obtained at different instants ( $t-1, t-2, \dots$ ).

The notation **MA(q)** refers to the moving average model of order  $q$ . It can be written as:

$$X_t = \mu + \sum_{j=1}^q \theta_j \epsilon_{t-j}$$

Where  $\mu$  is the mean of the series,  $\Theta_j = (1, 2, \dots, q)$  are the parameters of the model, and  $\epsilon_t$  refers to the error at the instants  $t-1, t-2, \dots$  [11].

This model is a way to transform non-stationary time series to stationary by computing the differences between consecutive observations.

The first and second respectively as [15, 16]:

$$\begin{aligned} \Delta X_t &= X_t - X_{t-1} && \text{differences can be defined} \\ \Delta^2 X_t &= (X_t - X_{t-1}) - (X_{t-1} - X_{t-2}) \end{aligned}$$

ARIMA model denoted by **ARIMA(p,d,q)** is expressed as follows:

$$\Delta^d X_t = c + \epsilon_t + \sum_{i=1}^p \varphi_i \Delta^d X_{t-i} + \sum_{j=1}^q \theta_j \epsilon_{t-j}$$

where  $P$  refers to the order of autoregressive model,  $d$  indicates the level of differencing for obtaining stationary time series and  $q$  is the order of moving average model.

### **C. Identification ARIMA model parameters and coefficients**

Generally, ARIMA model parameters  $p$ ,  $d$  and  $q$  are positive integers. The order of autoregressive model  $p$  and moving average  $q$  are determined by examining the properties of the autocorrelation function (ACF) and the partial autocorrelation function (PACF).  $d$  refers to the number of differences computed for transforming non-stationary time series to stationary time series [14, 15].

The estimation of ARIMA model coefficients is determined using least squares method or maximum likelihood estimation method suitable for time series [17].

The better model is obtained based on AICc (Akaike Information Criteria with correction). This measure aims to quantify the goodness of fit of the model, thus ARIMA ( $p, d, q$ ) with the minimum value of AICc is considered the best model [15, 17].

### **D. Checking the model**

Checking the model aims principally to determine if the chosen model is adequate. This verification is based on an examination of the residuals of the fitted model, i.e., if the selected model does not show significant

lag in ACF and PACF of the residuals, and a portmanteau test return a large p-value, then the residuals are white noise and this indicates that the selected model is adequate [15, 17].

## E. Performance evaluation of the model

Error measurement plays an important role in tracking forecast accuracy performed by the model. Mean Absolute Error (MAE) and Root Mean Square Error (RMSE) are measures frequently used in order to evaluate the forecasting performance of the models, they are defined respectively by:

$$MAE = \frac{\sum_{i=1}^n |X_{obs,i} - X_{pred,i}|}{n}$$
$$RMSE = \sqrt{\frac{\sum_{i=1}^n (X_{obs,i} - X_{pred,i})^2}{n}}$$

The relative error of the forecasting model is measured by the Mean Absolute Percentage Error (MAPE) expressed as:

$$MAPE = \left(\frac{100}{n}\right) \sum_{i=1}^n \left| \frac{X_{obs,i} - X_{pred,i}}{X_{obs,i}} \right|$$

where  $X_{obs,i}$  is the observed value,  $X_{pred,i}$  is the predicted value, and  $n$  indicates the number of forecast horizons. The difference between predicted values and the actual values observed are called residuals [18, 19].

## IV. EXPERIMENTAL RESULTS

### A. Datasets

The data used in this work are extracted from web ads related to apartments for sale in the four following neighborhoods: the first is Agdal situated in Rabat city, the second is Sidi Bernoussi in Casablanca, the third is Gueliz in Marrakech, and the fourth is El Alia in Mohammedia. The proceeded data have been collected during a period of three months.

Separating data into training and testing sets is important in order to evaluate the performance of the model. Therefore, we separated the data into 2 parts:

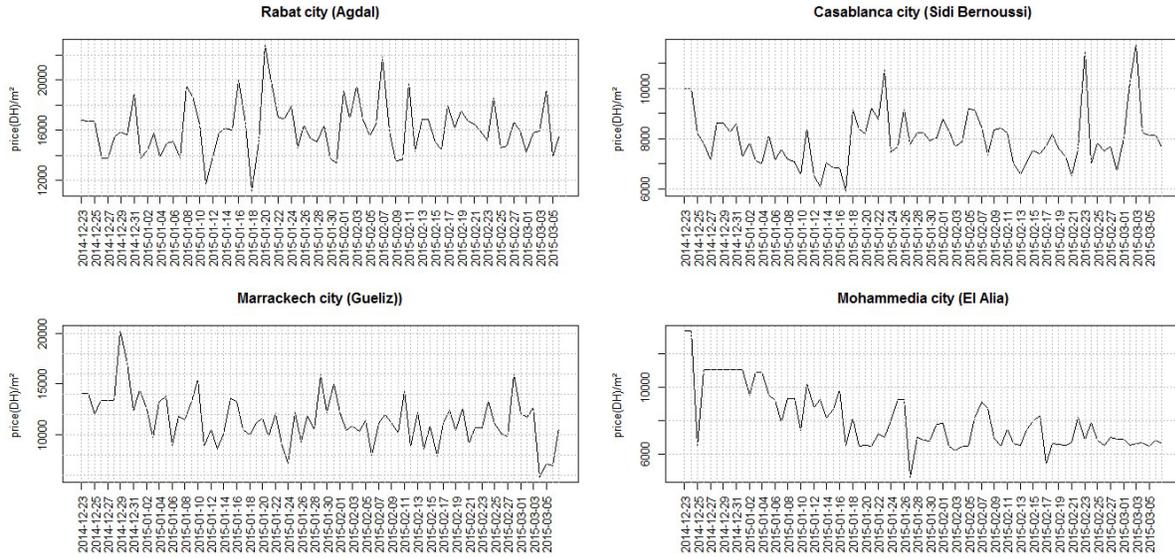
**Training set:** contains ads from December 23, 2014 to March 8, 2015. Generally, the predictive model use the training set in order to forecast the next fourteen days.

**Testing set:** used to evaluate the performance of the model from March 9, 2015 to March 21, 2015.

### B. Application of the ARIMA model for predicting apartments prices

In this section, we are interested in predicting the average price (per m<sup>2</sup>) of apartments in four neighborhoods located in different Moroccan cities. For each day, the predicted average price in a neighborhood is calculated based on the price of each apartment in this neighborhood.

Fig. 2 shows the mean price of apartments obtained from the training set.



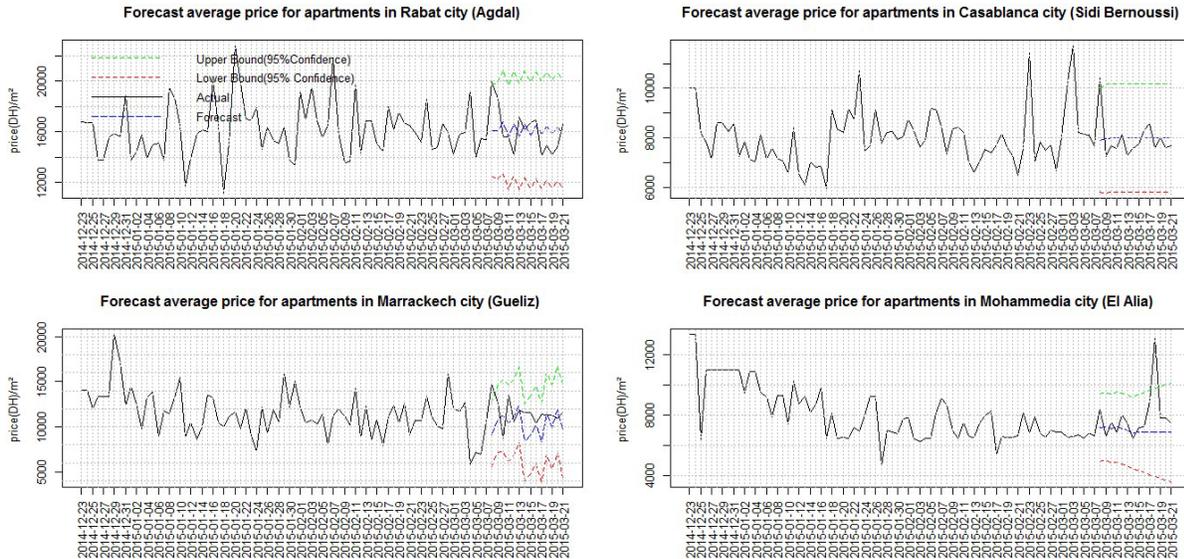
**Fig. 2.** The daily average price (MAD/m<sup>2</sup>) in the training set.

We have performed the prediction of the average price for the next fourteen days (from March 9, 2015 to March 21, 2015). Fig. 3 shows the result of the prediction for each neighborhood. The black curved lines show the actual values in the training and test sets, the blue curved lines show the forecasts, while the red and green curved lines show the confidence interval.

In order to illustrate the performance of each model, we have calculated the MAE, RMSE, and MAPE. The results are given in the table 1.

Neighborhood	MAE	RMSE	MAPE
Agdal (Rabat)	1480.857 MAD	1775.162 MAD	9.18%
Sidi Bernoussi (Casablanca)	541.4286 MAD	791.8247 MAD	6.43%
Gueliz (Marrakech)	1967.929 MAD	2460.612 MAD	16.49%
El Alia (Mohammedia)	1130.143 MAD	1871.143 MAD	12.14%

**Table. 1.** Error measures of the predictions.



**Fig. 3.** Predicting the daily average price (MAD/m<sup>2</sup>) with horizon  $h = 14$  days.

The MAE and RMSE values vary according to the price of each apartment. The price depends especially on the location and the date of the construction of the apartment. The average daily price depends also on the date of the announcements of sale.

## V. CONCLUSION

In this paper, we have conducted a study to predict apartments' price in four neighborhoods located in different Moroccan cities using web data.

The analysis of web pages to identify the relevant data has been based on web scraping. Collected data correspond to a period of three months and have been proceeded as time series.

The ARIMA model was chosen to forecast prices of apartments. AICc, ACF, PACF and portmanteau test have been used to select the best ARIMA model. Moreover, in order to evaluate the accuracy of forecasts, we have used several procedures including RMSE, MAE, MAPE. The experiment results show that it is difficult to predict the exact price every day, but the approximate prices returned by the model provide an idea on the evolution of the market. As future work, we plan to minimize prediction errors in order to make more accurate forecasts in long term.

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# Remote Sensing for Real-time Early Warning of Environmental Disasters and WRF Modelling

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**Abstract:** The Mediterranean Dialogue Earth Observatory (MDEO) is a NATO Science for Peace sponsored project, deployed at Abdelmalek Essaadi University in Tangier. It provides real-time and near-real-time data from EUMETSAT multiple earth observing satellites and permits early warning for an array of environmental disasters, such as flash inundations, storms, atmospheric pollution, landslides, etc. Raw data are transmitted to the ground station and the acquisition server, then, selected files are pushed to the processing server where they are sorted and analyzed with appropriate programs. Numerical Weather Prediction (NWP) models use satellite datasets as initial conditions to run the program, and make predictions. This procedure could help decision makers taking adequate measures to mitigate natural disaster risks.

The Weather Research and Forecasting (WRF), is a powerful NWP model that can be adapted to MDEO data sources, in order to simulate real-time environmental behavior, and forecast future scenarios. The WRF is used to study weather, air quality, wildfire, regional climate, etc., but requires the deployment of high performance computing techniques. In this paper, we will present MDEO infrastructure and WRF simulations of some environmental scenarios. We will also show the link between MDEO and WRF, and underline the benefit of real-time EUMETSAT data on the early warning, adaptation and mitigation of environmental disasters.

**Keywords:** EUMETSAT, Environmental Modelling, MDEO, Natural disasters, Remote sensing, WRF.

## VI. INTRODUCTION

The Mediterranean Dialogue Earth Observatory (MDEO) is a remote sensing platform installed at Abdelmalek Essaadi University in Tangier [1] [Fig. 1.]. It was funded by the NATO Science for Peace program, and is led by a group of experts from Turkey, Morocco and the USA [2]. The primary objective of the project is to facilitate early warning and mitigation of a wide range of biogenic and anthropogenic disasters. The project will also address mitigation of epidemics and epizootics, through identification and monitoring of infectious disease vector and reservoir habitat. On the other hand, the Numerical Weather Prediction (NWP) models analyze the input data and make predictions. The Weather Research and Forecasting (WRF), is a powerful NWP model that can use MDEO files to simulate real-time environmental behavior, and forecast future scenarios. In this paper, we will describe the MDEO platform, and will present the WRF model and required computing resources. Some simulation will be shown and discussed.

## VII. REMOTE SENSING WITH MDEO PLATFORM

MDEO is composed of a ground station, acquisition, processing, storage and backup servers. Eumetsat Satellites broadcast images to MDEO [3]. The acquisition system uses the new DVB-S2 receiver to get and decipher datasets.

The observatory receives real-time data from different geostationary satellites: Meteosat (7, 8, 9, 10), Metop (A, B), Jason-2, NOAA GOES (13, 15), MT-SAT and FY2. However, the GOES satellites are positioned over the Americas. Morocco is at the very edge of the mask that can be seen by GOES. Satellites that have coverage over Africa are Meteosat Second Generation (MSG). The way to get MSG data is through a service called Eumetcast. The access to Eumetcast is provided through the TeraCast system.

TeraCast is a complete solution for satellite and meteorological data reception in Europe, Africa and the Americas. It is used to receive rebroadcast data via the Eumetcast and Geonetcast Americas programs over telecommunications satellites, resulting in reception of global weather observations. Data is released in a variety of formats such as BUFR, NetCDF, GRIB and PNG. Users can depend on TeraCast to get information directly from satellites when the Internet is down. TeraCast system ingest automatically data into servers. The data is processed for viewing by TeraScan, a SeaSpace product that allow visualization and data analysis [4].

The objective of the Meteosat Second Generation (MSG) satellites is to provide images of the earth's atmosphere in support of weather forecasting and climate research. Datasets received by MDEO platform can be used in various applications related to disasters, health, energy, water, weather, ecosystems and agriculture [5].

Within the University campus, users have access to a dedicated MDEO Website. Once registered, they can choose the products that they need, and start the download [Fig. 2.]. The transmission frequency of data from satellites ranges from minutes to one day.



Fig. 1. MDEO ground station



Fig. 2. MDEO download page

In addition to real-time and near-real-time data products provided by MDEO, the access to Eumetsat archives allow running simulations on past data, and making prediction studies.

MDEO system should facilitate early warning and mitigation of a wide range of biogenic and anthropogenic disasters using remote sensing techniques. Some examples of concerns are flooding, storms, forest fires, climate change and its impacts, land use problems in agriculture, recent public health incidents, such as malaria, avian influenza, swine flu, as well as oil and hazardous chemical spills along the seashores.

## VIII. THE WRF MODELLING

The exhaustive MDEO data can be used as initial and boundary conditions by a NWP model. The WRF is a powerful NWP model with a spatial resolution ranging from a few meters to thousands of kilometers. In addition to weather forecasting, the WRF can also simulate atmospheric pollution, volcanic ash, wild fires and regional climate.

The WRF is a program for forecasting and research, developed under a partnership composed of more than 150 other organizations and universities in the United States and abroad [6].

The WRF processing links three main steps: preprocessing, core model execution and post-processing. The WRF Preprocessing System (WPS) prepare input to the real.exe program for real-data simulations. The preparation for WPS consists in setting up domains and interpolating static geographical data to the grids, extracting meteorological fields from GRIB files, and interpolating horizontally the meteorological fields to the model grids. The three preprocessing programs that are performing these tasks are respectively: geogrid, ungrib and metgrid as shown in Fig. 3. [7].

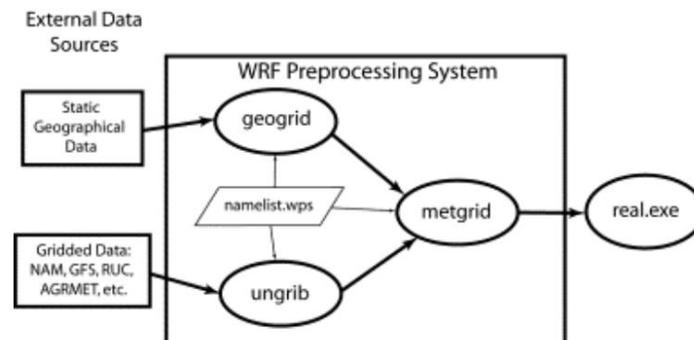


Fig. 3. WRF model workflow

The WRF is a compute-intensive program. In order to reduce the run-time, WRF was ported to the local Grid Computing called MaGrid [8, 9].

MaGrid is the Moroccan Grid Computing platform that supports e-science activities provided by the National Center for Scientific and Technical Research (CNRST) [10]. It provides users important computing and storage resources. Since the WRF can run in distributed and shared memory modes, the porting to Grid Computing was advantageous in terms of run-time reduction and large datasets storage [11, 12].

## IX. RESULTS

The domain of simulations is represented in Fig. 4. Two domains were considered. Fig. 5. shows temperature fields at two meters above the ground, in November 1<sup>st</sup>, 2011.

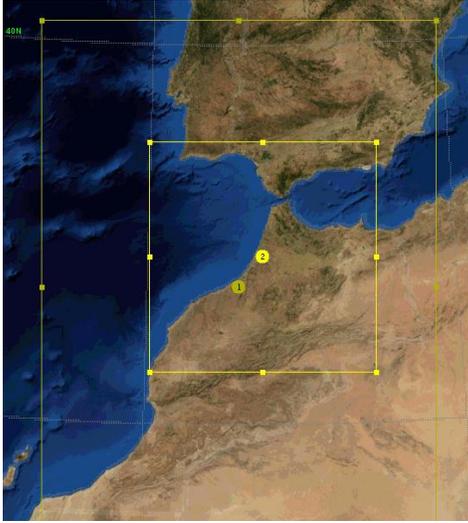


Fig. 4. North of Morocco domain

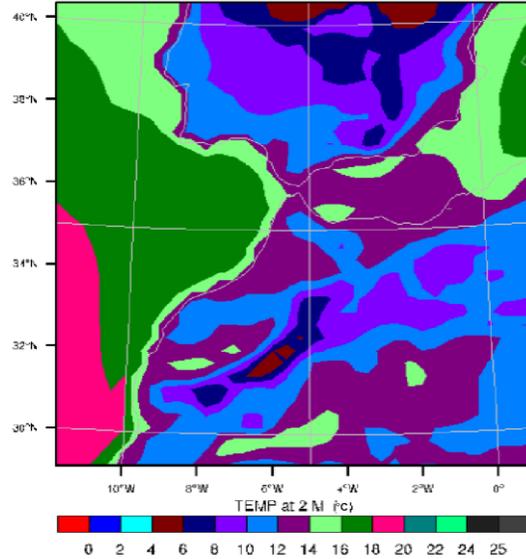


Fig. 5. Temperature at 2M, November 1st, 2011

A specific WRF configuration allow the model to run as RCM (Regional Climate Model). Simulations in this case covers a time period of years. Fig. 6. Represents the average temperature at two meters above the ground, simulated with WRF-RCM. Results are available at 6 hours intervals [13]. Once the data are downloaded and extracted, the downscaling starts with WPS. This process is repeated every month. The assimilated data have GRIB format and consist of surface data files and upper air data files.

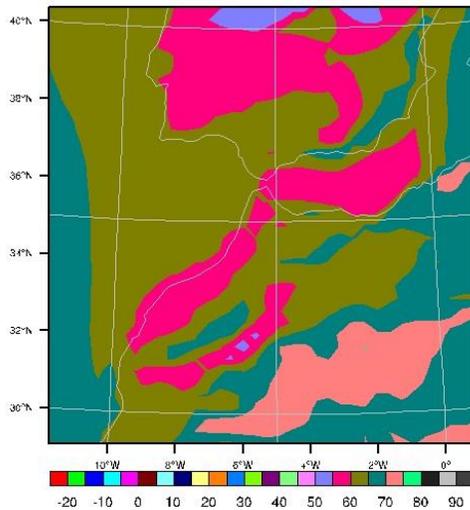


Fig. 6. Average temperature at 2M, summer, 2011

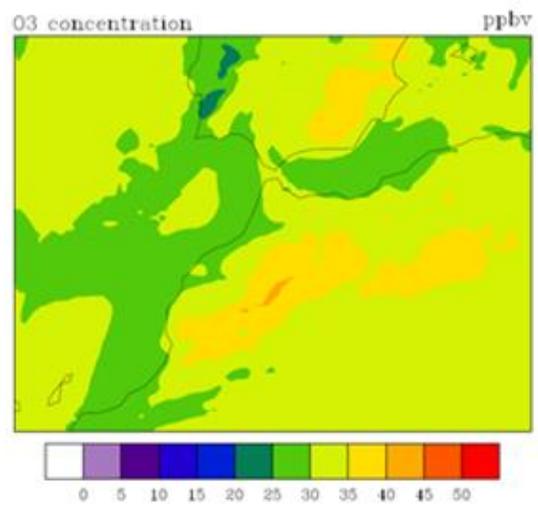


Fig. 7. Ozone concentration, November 1st, 2011

When WRF is coupled to a chemical package, the model can simulate atmospheric pollution and is called WRF-Chem [14]. Chemistry parameters of WRF-Chem are defined in namelist file. Often, pollutant emission data are obtained from the European Monitoring and Evaluation Programme (EMEP), which is a scientifically based programme for international co-operation to solve transboundary air pollution problems [15].

Fig. 7. shows high ozone (O<sub>3</sub>) concentrations nearby the Atlas Mountains, these regions are close to industrial zones in Casablanca, and to the petrol refinery located in Mohammedia. The ozone emissions are released and pushed by winds across these regions [9, 11].

The MDEO platform provide a range of environmental products, which can be used by the WRF as initial and boundary conditions. Datasets transmitted from Eumetsat satellites are real-time and near-real time data and are of high resolution thanks to the SEVIRI instrument technology [16]. In addition, the access to Eumetsat long-term archive of data allow WRF to run long-time period simulations.

## X. CONCLUSION

In this paper, the Mediterranean Dialogue Earth Observatory (MDEO) was presented. MDEO includes a real-time satellite remote sensing ground station, post-processing computer clusters and relevant storage. MDEO provides real-time data from Eumetsat multiple earth observing satellites, near-real-time data products and archival data access. These data can be used in WRF model to perform simulations covering a range of environmental applications such as weather forecasting, air quality and regional climate. These studies are very useful to stakeholders and decision makers who can take adequate measures to facilitate vulnerability assessment, early warning and recovery for an array of anthropogenic and biogenic disasters.

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# FLOSS ERP Systems Usage in Developing Countries: Case Study of a Moroccan SME

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**Abstract:** Although there is no universal definition for Small and medium sized enterprises (SME), they represent the majority of the economic sphere worldwide. As large enterprises, profit maximization is SMEs major goal, so here emerges the need for effective information management and efficient decision making through integrating business processes, and this is the role of Enterprise Information Systems (EIS). Enterprise Resource Planning (ERP) systems are one facet of modern EIS, that were, until recently targeted to Large Enterprises only, due to the expensive costs of a ERP project as well as to organizational issues for the case of SMEs. In addition to the basic idea of software reuse that is believed to reduce the development time and cost, give a richer feature set and increased quality as compared to development from scratch.

This ongoing research paper aims at doing a mix of both theoretical and practical research. On the one hand, we conduct a literature review of what has been advanced as academic and professional published works concerning the subjects of Free Libre & Open Source (FLOSS) ERP systems, Cloud ERP systems, motives, benefits and barriers to ERP systems adoption. On the other hand, a practical research is conducted through observation of a Moroccan SME -Aluminium Manufacturer and retailer-, adopting, implementing and using an Open Source ERP system as the main building block of their EIS.

**Keywords:** Developing Countries, Enterprise Resource Planning, Free/Libre and Open Source Software, Moroccan SME, Small and Medium sized Enterprise

## I. INTRODUCTION

We often think that it is the large, multinational companies that are the employment engines around the world. There is no question that they are very important to driving the global economy. However, most of us are more dependent on small companies for everyday activity. And, many people around the world are much more dependent on the existence of small businesses either as owners or employees, since the role that SMEs play in employment generation and economic recovery. Some economies are clearly driven by the existence of large corporations – and this will vary from country to country or region within a country to region.

In Morocco, SMEs are vital for the growth of the national economy, according to a report realized by the Moroccan Ministry of Finance and Privatization (August 2003), titled “Evaluation of SME financing in Morocco”, they represent over 95% of companies, occupy 50% of employees, and realize 31% of exports, 51% of national investment and 40% of production. Moroccan SMEs contribution to Gross Domestic Product (GDP) is limited to about 20% against 60% in some countries. Those statistics put the emphasis on the potential that SMEs have in bringing substantial contribution to the Moroccan economy. In addition to being aware of the fact that SMEs can provide new industries with a strong growth foundation along with strengthening existing ones, the Moroccan legislator has established new mechanisms and arrangements for overcoming the mainly perceived knowledge gaps as to funding, organization and technology. It is, therefore, one of the many instruments of a policy whose purpose is the establishment of a favorable climate for the creation, development and prosperity of SMEs.

As Lord Kelvin said, "If you cannot measure it, you cannot improve it." An Enterprise information system converts data from internal and external sources into information, and communicates that information in an appropriate form to users at all levels and all parts of that Enterprise. This enables them to make timely and effective operational, tactical and strategic decisions for planning, directing and controlling the activities for which they are responsible.

The geographical, technological and functional separation of information per unit / department, is a generally shared observation in our SMEs. Silos are created when different departments, sites do call for the use of different tools, technology and standards over time for operational and analytical data manipulation. These information "silos" created barriers to the intra-enterprise and extra-enterprise exchange of information, and posed significant challenges for both executives and managers within the same organization and building. Thanks to the central repository, a single point of acquisition, storage and distribution of data and information across all consumers-providers in one or more organizations, adopting and implementing an ERP system that is intended to facilitate information sharing, business planning, and decision making on an enterprise-wide basis, not only increases the reliability of past, present and future business data but also serves to break down information silos, thus minimize duplicate data acquisitions, performed by various departments and units within the same organization. Moreover, its modular application design offered by ERP systems, solves specific and immediate business challenges with the opportunity to expand and evolve to enterprise perspective over time instead of creating additional silos of information.

On the one hand ERP Vendors, till recently targeted Large Enterprises only, due to the expensive costs of a ERP project as well as to SMEs common organizational issues. Lately, they are re-discovering the SME market benefiting from trends in the IT industry that has contributed to making ERP systems available to smaller businesses. We cite as an example, the web revolution which reduce the enterprise IT investment on two fronts—hardware and personnel, and the raise of small PC-based networks which became much faster, more flexible, and cheaper than mainframes. On the other hand, Free/Libre and Open Source Software (FLOSS) actors, namely community and corporations, after the great success within the IT infrastructure, and development libraries, comes the turn to focus on developing and delivering business applications like CRM, Groupware, E-Commerce and ERP systems. As stated by Johansson and Sudzina (2009), “Open Source ERPs seem to be of an increasing interest at the moment. It could be asked if this interest is a result of dissatisfaction with proprietary ERPs or if it is a result of maturity in the open source phenomenon”, FLOSS ERP solutions raise, and their target groups include mostly SMEs.

Boldyreff (2005) stated that “ERP crosses over two different disciplines: software engineering and business expertise. In other words, dealing with EISs like ERP requires business expertise as well as technical expertise. This may have hindered the progress of the research in this area”. Thus, the purpose of this paper is to raise the elements that may support or daunt the adoption of FLOSS ERP systems, through the support of a Moroccan SME operating in the field of Aluminium Manufacturing and Retail, during its ERP adoption and implementation processes. Do FLOSS ERP systems present an opportunity for Moroccan SMEs? To answer this question we start by defining SMEs from the Moroccan legislator and professional group of banks point of view, then we give definitions for both ERP and FLOSS from the literature. Finally, we present the selection model for the FLOSS ERP when at the Acquisition phase of the ERP Project lifecycle that we hope will be a ground basis for future research on FLOSS ERP for SMEs in Developing Countries, as well as the results of our case study, discuss them and enumerate the different study limitations. Observations and practical feedback relevant to this case study, cannot be but of certain added value to the scientific and non-academic Information System communities focusing on the SME subject especially on Developing Countries.

## II. BACKGROUND

### A. Developing Country

The *Library of Congress Collections Policy Statement* outlines how the term – developing country – is used by quasi-governmental organizations:

- “The World Bank and the United Nations use different terminology to define “developing countries,” also known as “less-developed countries”. The latter organization also uses “least developed countries”, “small island developing states,” and “landlocked developing countries.” The World Bank’s main criterion for classifying economies is gross national income (GNI) per capita, previously referred to as gross national product, or GNP which is the dollar value of a country’s final income in a year, divided by its population. It reflects the average income of a country’s citizens, and its list of countries is divided into four categories [2] that are: High-income group, Upper-middle-income group, Lower-middle-income group and Low-income group. The United Nations has stated that: “There is no commonly agreed definition of developing countries.”
- In the United Nations and World Bank lists, the number of developing countries ranges from 104 to 152. The 2008 List of Developing Countries compiled by the World Bank has 152 countries. The World Bank also includes five high-income developing economies – because of their economic structure or the official opinion of their governments, as well as several countries with transition economies – based on their low or middle levels of per capital income. For this Collections Policy Statement, the Library considers a developing country one in which:
  - The majority of population makes far less income, and has significantly weaker social indicators, than the population in high-income countries...[and]
  - Lives on far less money—and often lacks basic public services—than the population in highly-industrialized countries.

Table 1: How the term – Developing Country – is used by quasi-governmental organizations

The World Bank	The United Nations	The Library of Congress Collections Policy Statement
Its main criteria for classifying economies is Gross National Income (GNI) per capita, previously referred to as Gross National Product, or GNP.	It has stated that: “There is no commonly agreed definition of developing countries.”	It considers a developing country one in which: <ol style="list-style-type: none"> <li>1. The majority of population makes far less income, and has significantly weaker social indicators, than the population in high-income countries.. [and]</li> <li>2. Lives on far less money—and often lacks basic public services—than the population in highly-industrialized countries<sup>2</sup>.</li> </ol>

## B. Small and Medium Sized Enterprise

According to the Organization for Economic Cooperation and Development (OECD), SMEs represent more than 95% of enterprises and ensure 60-70% of the jobs. The Small and medium sized Enterprise Charter in Morocco (Law No. 53 - 00, July 2002) states that SMEs are: “any business managed and/or administered directly by individuals who are shareholders, and is not owned by more than 25% of capital or the voting rights by one enterprise or several enterprises, falling outside the SME definition”. This threshold may be exceeded if the business is owned by: collective investment funds; corporate capital investment; venture capital organizations; and financial institutions duly authorized to use public savings to make financial investments, which do not exercise, individually or jointly, any control over the company.

In addition, Article 1 of Law No. 53 - 00 of 23 July 2002 relating to the forming Charter for SMEs provides the defining criteria of SMEs in Morocco differentiating between existing businesses and newly created companies (less than two years of existence).

Table 2: Conditions to be met by Moroccan SMEs according to Moroccan Charter for SMEs

Existing businesses (Existence > 2 years)		Newly created companies (Existence < 2 years)
Permanent number of workers not exceeding 200 people		NONE
Must have reached, over the last two years :	Either an annual revenues below 75 million dirhams after taxes.	Engage in initial global investment not exceeding 25 million dirhams
	Or a total annual balance sheet less than 50 million dirhams.	Maintain a ratio of investment per job less than 250,000 dirhams

As claimed by (Makhroute et al. 2013), this definition is never final and may be changed, according to the economic and social circumstances, to accommodate economic operators and institutions. A Joint Committee, composed of representatives of Bank Al-Maghrib and Professional Group of Banks in Morocco "GPBM", elaborated a new bank rating systems that allows the alignment of Moroccan banks to new standards from European agreements “Bale II”. The proposed new system provides rating scales differentiating companies according to their size (large enterprises, SMEs, micro-enterprises).

Table 3: SME Criteria Defined by Bank Al-Maghrib and Professional Group of Banks in Morocco "GPBM"

Company size	Permanent workforce	Revenues	Total balance sheet
Large enterprise	> 250 Employees	> 75 millions dirhams	> 90 millions dirhams
SME	< 250 Employees	< 75 millions dirhams	< 90 millions dirhams
Micro-enterprise	< 10 Employees	< 10 millions dirhams	< 15 millions dirhams

Since the definition of an SME is important for access to finance and EU support programmes targeted specifically at these companies, especially for the case of the kingdom of Morocco because of its historical, economical and geo-political relations with Europe. We present below the metrics to determine how a company is classified either as micro-, small- or medium-sized depends mainly on three factors: the number of employees and either the turnover or balance sheet total. According to the [EU recommendation 2003/361](#), these categories were established to provide assistance to smaller companies as an aid to sustain their growth and survivability.

Table 4: Metrics of Companies Classification according to the European recommendation 2003/361

Company category	Employees	Turnover	or	Balance sheet total
Medium-sized	< 250	≤ € 50 m		≤ € 43 m
Small	< 50	≤ € 10 m		≤ € 10 m
Micro	< 10	≤ € 2 m		≤ € 2 m

These ceilings apply to the figures for individual firms only. A firm that is part of larger group may need to include employee/turnover/balance sheet data from that group too.

### C. Enterprise Resource Planning

ERP systems are enterprise-wide software packages that provide fully integrated business processes using a common database and offering data visibility and information from various viewpoints (Stefanou 2012). An ERP system is defined as standardized packaged software designed to integrate an organization's entire value chain (Lengnick-Hall et al., 2004; Rolland and Prakash, 2000) and according to (Alshawi, 2004) "An enterprise resource planning (ERP) system is an attempt to create an integrated product that manages the majority of operations in a company. What is different about ERP systems is that they integrate across functions to create a single, unified system rather than a group of separate, insular applications". It is an integrated modular application software package that is designed to serve and support multiple business functions and which treats those business functions as a cohesive whole, allowing data to be shared between different functions, departments and units. Wier et al. (2007) argue that the aim of ERP systems is to incorporate business processes as well as ICT into a coordinated set of procedures, applications and metrics that can work over the boundaries of firms. ERP systems are all inclusive applications that can perform specific critical organizational functions. It makes the information flow smooth and dynamic. The purpose is to make the information flow instant and eliminate data redundancy, and to add more flexibility. It allows different units of the organization to come under one infrastructure. The data integration allowed by the ERP empowers the re-use of the data across all the systems (Mushtaq Ali Shah, S and Huq, N., 2010).

These ERP systems are built to manage all the enterprise activities through independent software modules. All these activities are connected and interact simultaneously and therefore, the database is continually updated (Baratashvili, T and Machtidze, T., 2014).

Each ERP software module is focused on one area of business processes and address one specific function among many, like accounting, human resources, sales, warehouse and purchases. This functional organization adds to the flexibility of the ERP product as each module can be individually purchased or developed, based on what best meets the specific needs and technical capabilities of the organization. In occurrence, ERP software systems are usually packaged in functional –pieces- modules that can be implemented in various combinations. This modular design also allows software developers to put together product offerings for specific industries and focus on specific functional needs while not re-inventing the wheel by duplicating the more universal functions like inventory control and purchasing.

According to “F Nah, J Lau (2001)”, An ERP implementation (transition) strategy determines how the organization will be moved from legacy system to the new ERP system. There exist several transition strategies in literature but all of them are the variants of the four basic types: Big bang, Phased, Parallel and Hybrid. Every implementation strategy whatever it is, has its own set of advantages and disadvantages. The Parallel adoption strategy takes the greatest amount of resources and is very cost intensive, we will not included in the descriptive table below.

Table 5: The three most widely discussed ERP implementation strategies

<b>Big bang</b>	<b>Phased rollout</b>	<b>Parallel adoption</b>
Implementation happens in a single instance. All users move to the new system on a given date.	Changeover occurs in phases over an extended period of time. Users move onto new system in a series of steps.	Both the legacy and new ERP system run at the same time. Users learn the new system while working on the old.

#### D. Free / Libre and Open Source Software

In the Software industry we find Open Source versus Closed Source Projects, Free/Libre versus Proprietary Software. The main idea behind software reuse is to take advantage of existing software components and reuse them in other software systems. Software development with reuse is believed to reduce the development time and cost, give a richer feature set and increased quality as compared to development from scratch.

We have copyleft, Then copyleft and Lately Permissive Licences arise. Both copyleft and permissive licenses allow users to freely copy, distribute, and change the software that use them. To this extent, both are considered free licenses.

The US Copyright Office has this to say about [copyright](#) at the time of this writing:

Copyright is a form of protection provided by the laws of the United States (title 17, U. S. Code) to the authors of "original works of authorship," including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to both published and unpublished works. Section 106 of the 1976 Copyright Act generally gives the owner of copyright the exclusive right to do and to authorize others to do the following:

- To reproduce the work in copies or phonorecords;
- To prepare derivative works based upon the work;
- To distribute copies or phonorecords of the work to the public by sale or other transfer of ownership, or by rental, lease, or lending;

- To perform the work publicly, in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works;
- To display the work publicly, in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work; and
- In the case of sound recordings, to perform the work publicly by means of a digital audio transmission.

The key to understanding copyright is the phrase "the exclusive right".

When we call software “free” we mean that it respects the users' essential freedoms: the freedom to run it, to study and change it, and to redistribute copies with or without changes. A program is free software if it gives users adequately all of these freedoms. Otherwise, it is nonfree. This is a matter of freedom, not price, so think of “free speech”, not “free beer”, as stated by Richard Stallman one of the most forceful and famous practitioner/theorist of free software.

There are three entities in the Free Software movement where people turn to for evaluations of Free Software licenses: The Free Software Foundation (FSF), the Debian project and the Open Source Initiative (OSI). Historically, “Free Software” was the first term created, and a first documented complete definition that presents the criteria for whether a particular software program qualifies as free software, appears to be the GNU's Bulletin, vol.1 no.1, published on February 1986. Thus according to the FSF, a program is free software if the program's users have the four essential freedoms listed in the table below:

Table 6: The Free Software Definition of the Free Software Foundation

(freedom 0)	The freedom to run the program as you wish, for any purpose (freedom 0).
(freedom 1)	The freedom to study how the program works and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
(freedom 2)	The freedom to redistribute copies so you can help your neighbor (freedom 2).
(freedom 3)	The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

On July 5, 1997, The producers of the Debian system, a project aiming to create a completely free and community based GNU/Linux distribution, have created the “Debian Social Contract” where they designed and defined the “Debian Free Software Guidelines” (DFSG) as a set of commitments that the Debian producers agree to abide by, as well as a check-list to decide whether a program can be included in the Linux distribution or not, as advanced by B. Schießle (May 11th, 2012).

In 1998 the Open Source Initiative was set up as a marketing campaign for Free Software and introduced the Open Source definition and the goal was to seek fast commercialization of Free Software and acceptance of Free Software by the companies and venture capitalists of the booming new economy. The OSI, by copying the DFSG, replacing “Free Software” with “Open Source” and removing the Debian-specific references from the DFSG, has created The Open Source Definition.

When the European Commission started dealing with Free Software on a regular basis, they sought to avoid the ambiguity of the English word "Free Software" and the misunderstandings of "Open Source" alike, which led to the adoption of a third term which has popped up occasionally since around 1992: "Libre Software." This term has proven resistant to inflationary usage and is still used in an identical way to Free Software. So it may pose a solution for those who fear being misunderstood when speaking English; As advanced by the Free Software Foundation Europe.

Typically, software licensing is designed to protect the intellectual property rights of software owners; However the objective of Open Source licensing is to protect the open distributability of the software. FLOSS licensing structures are classified as either Restrictive or Permissive, others somewhere in between. The classification is based on the distribution intent of the original owner.

Table 7: Description of the two FLOSS license types

Restrictive licenses	Permissive licenses
<p>Are preferred by projects who want to ensure the future openness of a project; they restrict the ability to make a derivative project's code proprietary. Restrictive licenses require derivatives, improvements, or enhancements to be made available under similar terms. Examples of restrictive licenses are Copyleft, reciprocal licenses and the GPL.</p> <p>Restrictive licenses were defined as those that required derivative works to be released under the same license.</p>	<p>Are often preferred if a project needs to protect trade-secrets or is intended for a secure environment. Although the licensing of the original project remains in force, modifications and enhancements may become proprietary. The distribution of code is permitted provided copyright notice and liability disclaimers are included and contributors' names are not used to endorse the new product. Examples of permissive OSS licenses include the Berkeley Software Distribution (BSD) license and the Apache Software License.</p> <p>A copyleft license forces any "derivative" work to also be open source and copyleft.</p>

*Copyleft* is a term coined by the FSF and implies that if you distribute a derivative work of a work under a copyleft license, you *must* distribute the derivative under the *same license* as the original work (it may however be combined with works under a permissive license that is deemed "compatible", read on). Some people use the pejorative name "[viral license](#)" for a copyleft license. As of this writing, the Free Software Foundation has this to say about [copyleft](#): Copyleft is a general method for making a program or other work free, and requiring all modified and extended versions of the program to be free as well. The simplest way to make a program free software is to put it in the public domain, uncopyrighted. This allows people to share the program and their improvements, if they are so minded. But it also allows uncooperative people to convert the program into proprietary software. They can make changes, many or few, and distribute the result as a proprietary product. People who receive the program in that modified form do not have the freedom that the original author gave them; the middleman has stripped it away.

The key to understanding copyleft is in license heritability and the availability of copyrighted material

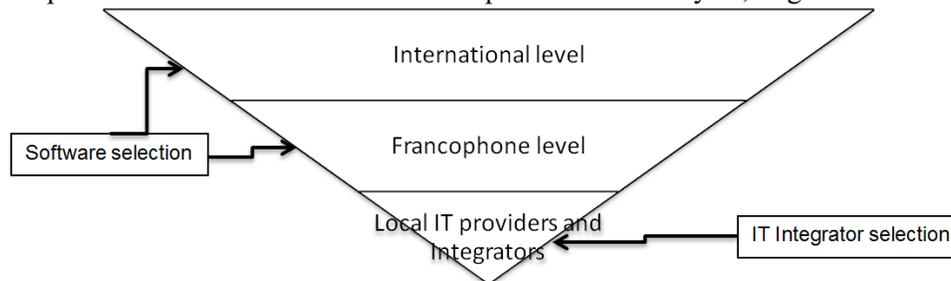
Permissive licenses, on the other hand, were defined as those that let licensees do what they want with the resulting work, including selling it. A *permissive license* is a license that permits re-licensing of derivative works (i.e. the derivative can have a different license than the original, and even be closed source).

At the end Free Software, Libre Software and Open Source Software, all connotes freedom, thus to settle the ambiguity around these used terms, Richard Stallman reported that a researcher studying practices and methods used by developers in the free software community decided that these questions were independent of the developers' political views, so he used the term “FLOSS,” meaning “Free/Libre and Open Source Software,” to explicitly avoid a preference between the two political camps. If you wish to be neutral, this is a good way to do it, since this makes the names of the two camps equally prominent.

## E. Methodology

For an ERP project, like any other EIS projects, there are both the adoption and the appropriation phases. We present in this paper, the method used to tackle the selection step of the ERP project lifecycle for the case of Moroccan SMEs (figure 1). The method starts with listing all interesting FLOSS ERP systems, available, used by professionals and well renowned worldwide, then the same process should be done once again for the software selection restricted to the French-speaking countries. Afterwards, comes the step of IT providers and Integrators selection for the ERP implementation to be assured and done.

Figure 1: Proposed framework for the selection step of the ERP lifecycle, targeted to Moroccan SMEs

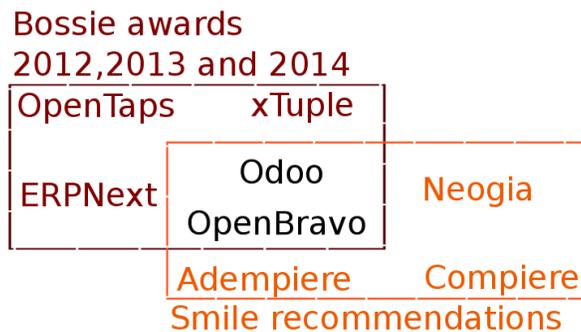


The annual InfoworldBossie Awards are given to the best and most innovative open source software products for end users, businesses and IT professionals in various categories, from InfoWorld that is an [information technology](#) media business founded in 1978. Their web site is considered to be the Web site for IT decision makers seeking to modernize their operations using the latest technologies, architectures, and strategies. First of these awards were announced in September 2007, and were given to 36 software applications across 6 categories: The best open source applications, The best open source application development tools, The best open source data center and cloud software, The best open source desktop and mobile software, The best open source networking and security software and The best open source big data tools. The software were adjudged by the InfoworldTest Center editors, contributors and reviewers. For the selection phase of an Open Source ERP, Odoo has been chosen for many reasons, based mainly on the best open source software applications “BOSSIE” winning awards for the three last years (table 5), then on the Open Source ERP systems recommended by Smile’s white paper titled ‘ERP, the best of FLOSS solutions’ revision of 2015, accessed 20 March 2015 (figure 2), the Smile Enterprise is one of the leading open source players in France and Europe. Besides, it has received the award for Best European Partner of Odoo, the Enterprise is also very well renowned for its several white papers discussing different aspects of FLOSS systems and projects.

Table 8: Best of Open Source Applications According to inforworld.com 2012, 2013 and 2014 BOSSIE Awards

Years / FLOSS Business Applications	ERPNext	xTuple	Odoo	OpenBravo	OpenTaps
2014	YES	YES	YES	YES	YES
2013	YES	YES	YES	YES	-
2012	-	YES	YES	YES	-

Figure 2: An intersection of the investigation’s results on best professional recommended FLOSS ERP systems



We can clearly see that both Odoo and OpenBravo are the most recommended and agreed on FLOSS ERP systems to be used, and then comes the number of IT partners in Morocco that are able and well trained to support Moroccan SMEs ERP systems project implementation. A simple research on google, yahoo and bing search engines with “partenaireodoomaroc” as keywords for the research, gives us in the first results page, a minimum of 4 Odoo partners against only a maximum of 2 OpenBravo partners by using “partenaireOpenBravoMaroc”, as listed in the table below :

Table 9: Comparison of the number of business partners in Morocco for both Odoo and OpenBravo in the first result page on all of Google, Yahoo and Bing search engines.

SearchEngine frlanguage	Keywords = « Partenaire odoo Maroc »	Keywords = « Partenaire openbravo Maroc »
Google	6	2
Yahoo	4	2
Bing	6	1
<b>Min / Max</b>	<b>Min = 4</b>	<b>Max = 2</b>

Table 10: Descriptive table of the Moroccan SME Case Study

<p><b>Integrator : SAYOO sarl</b></p>	<p><b>SME : Located in Rabat, a 100%, Moroccan family-owned company.</b></p>
<p>Moroccan SME, created in 2013, Specialized on Management Software Implementation, configuration and customization, based on FLOSS technologies, with more than 9 successful ERP projects.</p>	<p>Aluminium manufacturer and retailer specialised in window and door frames, shelving and associated types of frames and supports.</p>
<p><b>Software : Odoo</b></p>	<p><b>Hardware : Commodity Hardware that is affordable and easy to obtain.</b></p>
<p>Web based ERP Software;  Benefits from Linux and Postgresql Stability for production use and BackUp Strategies;  Large and Active users community abroad, and Moroccan users community getting larger.</p>	<p>Computer hardware that is affordable and easy to obtain. Typically it is a low-performance system that is IBM PC-compatible and is capable of running Microsoft Windows, Linux, or MS-DOS without requiring any special devices or equipment to maximize savings in IT design.</p>

## F. Findings

Serrano and Sarriegi (2006) state that the benefits of applying FLOSS are greater for ERPs than for other kinds of applications, for three main reasons:

- Increased adaptability. ERPs are not plug-and-play. They always need an implementation project to match the business processes and local regulations. Having full access to the ERP source code can facilitate this unavoidable customization. Trade barriers, custom and technical regulations, tariff rates and import taxes, warranty and non-warranty repairs, export controls, labeling/marketing standards, conformity assessment, product certification, and accreditation overview, in addition to membership in Free Trade Agreements with the Maghreb Arab Union, Saudi Arabia, Jordan, Tunisia, Egypt, USA and EU, are all elements of an equation that proves the fact that Moroccan SMEs are highly flexible and adaptable to change, and so must be their EIS.
- Decreased reliance on a single supplier. Businesses that acquire a proprietary ERP are highly dependent on the product builders and distributors – that is, the source code’s owners. If one, or even both, of these agents disappears, upgrading and maintaining the ERP can pose significant problems. An ERP system is a complex piece of software; therefore joining a promising and stable project is better than starting a new project from scratch in the bazaar style.

This advice is aligned with the traditional wisdom of reuse as well.(Boldyreff, 2005) Especially with FLOSS ERP, where its FLOSS nature and modular design also allows any qualified software developer to put together product offerings for specific industries and customize the software to be adaptable to the everchanging functional needs while not re-inventing the wheel by duplicating the more universal functions like inventory control and purchasing. Customers benefit by not having to buy and maintain functionality that they don't want or need. Specialized Institutes of Applied Technology (ISTA) that is present in most of Moroccan cities, Students bearers of general university studies diploma, and State/Private schools of engineering graduates, are all potential systems integrators or at least qualified software developers for the Moroccan local market, that can help decrease the reliance on a single supplier.

- Reduced costs. Proprietary ERP licenses are expensive. A rule of thumb puts them at between one-sixth and one-third of the implementation project costs. OSS ERPs avoid this cost. Furthermore, they usually do not need expensive hardware to run. Although Open Source system do not have licenses costs, the probable budget is spent with IT staff and/or consultants (Gripe, F.G.S and Rodello, I.A., 2012). Besides, Boldyreff (2005), states that the ever-falling price of hardware has also contributed to the popularity of OSS. Unlike in the past, nowadays the cost of software applications could easily surpass that of the hardware components in a system. This reversal has forced suppliers and customers to rethink the conventional software licensing models used in business The SME, unit of study, expresses that the use of a web based ERP system is more important than it being FLOSS or proprietary, because of the costs of ERP software clients to be reinstalled each time viruses, and other sort of malwares slow down the PCs on which the software clients are installed. In Morocco, reformatting and reinstalling a PC with an Operating System and Software utilities costs no more than 200 Moroccan dirhams, but re-installing, the ERP software client can vary from 500 dh to 2000 dh, which will make the ERP system's total cost of ownership not affordable for SMEs, especially, when there are tens of system's users.

Once the ERP system selected, implemented and being used by the SME, the following was observed:

The ERP system appropriation rate can tumble down, once it comes to bills, taxes and margins, if the system does not give the SME the needed Adaptability and Flexibility.

Most of the time the talk about Literature review concerning FLOSS ERP is outdated, since it still refers to Sourceforge and to Google Code, but the present and the future is with Github. A lot of statistics have no scientific basis, most of them are just lies, of course, but Github currently has 2M repositories (including forks), as compared to Sourceforge's 300K projects. Seeing as how SF is over ten years old and Github was launched in 2008, that clearly says that Github is where the real action is now. In addition, many active projects have moved away and recently most developers have GitHub accounts.

## **G. Limitations**

The period of time "7 months" is enough for every aspect to be raised, except for aspects related to the involvement and evolution of the SME's activity. So we can study the potential of the ERP system modularity.

Besides the very well renowned web-based source code repository “SourceForge”, new source code repositories that hosts FLOSS projects in general has emerged, like Github and Bitbucket, and has gained in popularity among FLOSS developers and contributors, we will try to establish a clear and concise comparison of the different FLOSS ERP systems no matter where they are hosted.

The SME, unit of our exploratory study, neither benefited from the “Imtiaz” nor the “Moussanada” programs launched by Morocco’s National Agency for the Promotion of SMEs. it would be helpful to compare between the cases where a SME is eligible and take advantage of one or both the two programs, with the actual case that do not benefit from any of them both.

### III. CONCLUSION

Ultimately Boldyreff (2005), mentioned that looking at the number of reported research on Open Source ERP published in Scientific and Academic journals and proceedings, compared to the numerous articles that have been published in non-academic industrial trade magazines, implies that currently there is a gap between the market demand and the research carried out by academics.

In this paper, we have found that FLOSS ERP systems adoption is not of an issue for Moroccan SMEs, unless it is not a web based ERP system, for it being used on-line through Internet, as a Cloud solution or only accessible from a local area network; we have proposed a selection framework depending essentially on two factors, the software factor and the business partner factor. Furthermore, a FLOSS ERP system, despite of it taking advantage of the four freedoms of a FLOSS license, see its appropriation rate tumble down, depending on the flexibility and adaptability that the system offers concerning bills, taxes and margins.

This contribution increases the understanding of software selection through focusing on describing the actual FLOSS ERP selection practice. We provide empirically grounded descriptions of the best practices ICT Integrators and IS managers actually use when selecting FLOSS components in general and FLOSS ERP systems in particular..

In terms of managerial implications, the findings presented are of interest for both SMEs that want to adopt a FLOSS ERP system and look for a successful ERP implementation and for IT providers and integrators that target Moroccan SMEs’ Information Systems and largely any Developing Country SME; It is shown that there are cultural and organizational reasons other than the costs involved when deciding on which ERP system to choose.

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# The impact of the implementation of the ERP on end-user satisfaction Case of Moroccan companies

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**Abstract:** In recent years, the implementation of ERP is as a lever for development and inter-organizational collaboration. The ERP is a powerful tool for integration, sharing of information, and fluidizing of the process within the organizations (El Amrani et al. 2006 ; Kocoglu and Moatti, 2010). If the organization fully integrated remains a "myth" (to use the expression of Segrestin et al. 2004), profits are nevertheless removed from the adoption and use of the ERP.

As to the interest of the information systems for the companies, there is more to discuss our days ; it is of a clearly indisputable for the companies that are now seeking competitive advantages and a means of competitive differentiation, and this, by the access to information in real time and through a single source as well as the implementation of best management practices.

The company must not only equip and computerization but it must opt for the establishment of an IT infrastructure "optimal" who will respond to its present and future needs. OF or the interest of the application integration, and specially of the ERP who come remedy the situations mentioned. This article proposes a model and tests to evaluate the success of a system "Enterprise Resource Planning "(ERP) based on a measure of user satisfaction. Referring to the model DeLone & McLean (1992) [1] and the work of Seddon & Kiew (1994) [2]. The criteria that can influence user satisfaction, to ensure the successful implementation of the ERP system are identified.

The management science literature has often emphasized the importance of meeting individuals in the organization as a key concept of increasing productivity and acceptance of ICT by end users (Delone and Mclean, 1992). This dimension has been used extensively in the literature as the dependent variable the effectiveness of information systems. DeLone & McLean (1992) fall within a number of 33 empirical studies published between 1981 and 1987 who appreciate efficiency, in terms of Satisfaction (Bailey and Pearson, 1983; Ives, Olson & Baroudi, 1983; Doll & Torkzadeh 1988, etc.). User satisfaction with ERP systems is one of the important determinant of the success of these systems. (Somers et al, 2003) Melone (1986) stated that there is no consensus on a conceptual definition of built user satisfaction. Indeed, user satisfaction was associated with many terms such as "felt need", "acceptance of the system," perceived usefulness ""appreciation of the Management Information System", "feeling" (Ives and al1983).

The results of the exploratory study, carried out on 60 users in 40 Moroccan companies, shows that user satisfaction of ERP is explained by the quality of the ERP system, perceived usefulness and quality of information provided by this type of system. The study also found that the quality of change is a predictor of satisfaction measured by user involvement in the implementation of ERP, the quality of communication within such a project and the quality of training given to users.

**Keywords:** Enterprise Resource Planning (ERP), User Satisfaction, Quality Change, Information Technology (IT), Information Systems, success, evaluation approaches, Evaluation Success Factors.

## XI. INTRODUCTION

The current context of global economic activity is characterized by a large and permanent competition as well as a large customer requirement for immediate and complex solutions. In this context, process control and continuous improvement become prerequisites for success. As a result, numerous companies around the world are trying to take advantage of an overhaul, using software packages, their information systems, and hundreds of them have opted for systems integrated management ERP (Enterprise Resource Planning) as a basis for the integration of their industrial management (Marbert, Soni & Venkataramanan, 2000). [3]

The use of information and communication technologies (ICTs) such as ERP seems to be a great contribution to the profound changes in the functioning of companies. These packages make reference to information systems (IS) implemented to integrate the flow of information at the level of the entire organization. To achieve this integration between functional areas, ERP operate a centralized database that stores the collection and organization of data in "real time". Technological innovation of these software management can realize the old dream of the companies to have a single repository, and integrated their management information system (GIS) (Davenport, 1998) [4]; Rowe, 1999). Organizationally, the implementation of ERP is considered a change in the information system and in the process of guidance and control (Gomez et al. 2002).

In fact, if many companies are attracted by the ERP, it is because this is supposed to make gains in productivity and efficiency, including the ability to make more integrated organization. This integration concerns both automated business processes that information processed by the software (Perotin, 2002). [5] Indeed, integration is placed among the main reasons companies to equip an ERP (Marciniak 2001).

Lequeux (1999) [6] defines the ERP system as "a subset of the IS able to take over the complete management of the company, including accounting and financial management, production management and logistics, managing human resources, administrative management and the management of sales and purchases. "

In other words, Perotin (2002) argues that the ERP system is defined as all "configurable and modular software applications, designed to integrate and optimize business management processes by providing a single repository and consistent and based on standard business rules".

However, these systems are, in many cases, adopted without their suitability to the organizational context of the company is evaluated. Hence their implementation could result in low levels of user satisfaction, and therefore low levels of success. Moreover, these companies do not have often adequate tools that allow them to evaluate these systems and whether they meet the needs of individuals who use them.

The change must be seen as a solution enabling the organization to respond to quality management problem and adapting to look as well as its environment itself (Florescu Dumitru & 2007). A driving change plan is able to reduce resistance now.

This study is interesting on two levels:

- The objective of this article is therefore to identify the drivers of satisfaction of users of ERP systems. On a finer way, we try to determine the satisfaction and enhance the need for good conduct ERP projects to increase the degree of the satisfaction. To do this, it was reduced to build a model for the explanation of this satisfaction.
- In what follows, we will try to review the state of the art in measurement of user satisfaction of IT before submitting the research model and the results of an exploratory study conducted with a sample of Moroccan companies.

## XII. ERP AND ITS CONTRIBUTIONS FOR USERS

The evolution of computing, which is progressing towards greater information sharing and flexibility is a key factor explaining the growing success of ERP to companies. Despite the unquestionable progress they make today, ERP do not fully meet satisfactorily the needs of companies.

### 2.1 *The emergence of integrity management software*

Historically, functional systems businesses were developed on different materials following different methodologies: the achievements are generally heterogeneous both in terms of data representation at the level of processing modes. It follows multiple disadvantages:

- Communication problems between areas expected to share common data;
- Process control challenges due to the multiple treatments required to obtain synthetic statements;
- Students maintenance costs in the absence of modularity resulting low scalability;
- Complexity of the training was the use of very varied software;
- Difficulties for many controllers, in the collection and re-keying data from different systems and serving to consolidate budgets, develop reporting tables, etc.

Faced with these recurrent difficulties, software companies and large consulting firms offer a single answer in the form of integrity management software to improve the overall consistency while allowing modularity.

### 2.2. *What is an ERP?*

Acronym of American origin, ERP (Enterprise Resource Planning) is commonly used to designate the integrity management software. The term "ERP" is not totally adequate because it puts only evidence planning appearance. However the French translation "ERP" does not include the planning dimension and its use is problematic.

As defined by Robert Reix (1999), an ERP is a computer application that incorporated the following general characteristics:

- An ERP is a software package: according CXP4, a software package is "a coherent and independent set is service programs, supports, or handling of information and documentation, designed to perform standard IT processes, including the distribution is of a commercial nature and that a user can independently use after installation and limited training "(Sourdeau 1997, p20).
- An ERP is customizable: standardized product, the ERP is designed originally to meet the needs of various businesses. It usually are different versions by sector (automotive, banking, etc.) and prolonged use. In addition, the adaptation of the product to the needs of a particular business is by setting (choice of management rules, choice of treatment options, choice of data format, etc.). The setting may be accompanied by an appeal has additions of specific programs articulated around standard programs.

- An ERP is modular: it is not a monolithic structure but a set of programs or separable modules each corresponding to a management process: installation and operation can realize autonomously. The division into modules allows you to dial a specific solution for assembly and extend the implementation has different areas of management.

-A ERP is integrated: the various modules are not designed independently they can exchange information according to patterns provided. The PGI guarantees at all times a perfect integrity and data consistency for all users, allowing DC to end interfacing problems, synchronization and double entries.

- An ERP is a management application: it captures the company's transactions (accounting, stock management, order tracking and production program ...) and propagates the information collected to the appropriate levels. However, it contains no optimization program or automatic decision.

Meanwhile, other software and software packages are developed to complement the ERP software to improve certain poorly performing functions or to add new ones. Most of these applications concern the decision support: the whole is then called "System Organizes around an ERP" (SO-ERP).

### *2.3. Literature review on approaches, models and frameworks ERP success*

This part focuses on literature research is the success to summarize the two theoretical backgrounds and empirical studies. The presentation will be followed chronologically in terms of frames, models and approaches developed in the IS field. Then we will focus our attention on ERP as the main subject of this study. A review of the measurement of different approaches regarding the assessment of the success of ERP will be discussed to highlight the importance of the measure in the information system and in particular the ERP software.

#### *2.3.1- successful frameworks for the evaluation of ERP*

Development of a framework is the first step in the success of the assessment which must be adapted to the characteristics of the information system (Chand et al., 2005 [7]; Irani et al, 2014 [8]; Stefanou, CJ, 2001 [9]; Uwizeyemungu and Raymond, 2010 [10]) many frameworks have been proposed taking into account several phases and dimensions of evaluation of the system's success: strategic, tactical and operational. Generally, the framework describes eight categories: theoretical basis, the research approach, the object of analysis, the unit of analysis, the prospect evaluation, data collection, data analysis and type methodology (Urbach and Smolnik, 2008) [11]).

#### *2-3-2 The PAC Setting*

A proposal CPC could be considered an important framework for assessing the success of the ERP system because it incorporates three major dimensions part of the evaluation: content, context and process (Irani and love, 2008, Irani, 2002; Song and Letch, 2012). This framework was developed by (Irani and Love, 2008; Irani, 2002) [12] to help managers and decision makers in the process of assessing the benefits of IT / IS. They argue that there is not a good framework to evaluate the impact of IT in the performance of the organization in the literature and they added that there is no good framework to select appropriate tools for IS investment. For these reasons, they try to offer a CCP framework for assessing the cost and benefits based on three concepts: Content, context and process. But we conclude after analyzing this framework it is too big and general to be applicable to conduct an evaluation of the success of the ERP system.

#### *2-3-3- framework Stefanou*

Part of Stefanou consists of four phases: the first considers the vision of the company as a starting point for ERP integration. The second phase focuses on the needs of business and the company's ability to support and adapt the ERP system. The third phase requires estimation of the costs and benefits of integration of the ERP system. The last phase refers to the analysis of issues related to the use ERP, maintenance and evolution.

The product quality is one of the most important of the ESF in the project; in this case, the quality of the product means that the quality of the ERP system. Many measures are proposed to assess the quality such as response time, convenience of access, implementation of user requirements, error correction, data security and models, system integration, system flexibility the effectiveness of the system, database content, data currency, correctness and accuracy of the data system (DeLone and McLean, 1992).

#### *2-3-4- Soh and Markus framework*

The ultimate goal (Markus and Tanis, 2000; Soh and Markus, 1995) that works is to create a new framework that allows a better understanding of the concept of ESS (Enterprise System Success). Answering these questions: how companies can successfully integrate this technology? And what can we do to improve the chances of success? Authors define the result of success as a multidimensional concept, a dynamic concept, and a report (the concept of "optimal success," that represents the best of an organization can hope to achieve with enterprise system). P. 184.

Success can be defined by (Markus and Tanis, 2000) in terms of implementing the project, or in terms of business results. The first definition answers the question: the company managed to get the system running within some reasonable budget and schedule? The second answers the question: the company has managed to achieve its business objectives for the project?

Based on the theories of fusion process because (Markus and Tanis, 2000) consider that these theories combine both objectives and actions with the external forces and luck. They build their frame on a process designed by including emerging theory (Soh and Markus, 1995) to explain how the system of the company as a technology creates business value in organizations.

#### *2-4- The measurement models of successful ERP system*

Many models have been developed to evaluate the systems and the success of technology (Davis, 1989b; DeLone and McLean, 2003 1992 Gable et al., 2003; Ifinedo and Nahar, 2006; Sedera and Gable, 2010; Shang Seddon, 2002). These models have been validated empirically by numerous studies in the information system. The results show that many case studies are studied by applying the DeLone & McLean model success using a modeling approach structural equation (Dörr et al., 2013).

However, these models assess the success of three levels of impact. The first is an individual impact (Davis, 1989a) that lights on user behavior. The second level is the group of impact (Gable et al., 2003; Sedera and Gable, 2010) interesting on the working group and its influence on performance, and the third is an organizational impact (DeLone and McLean, 1992). While one model could evaluate more than one level of impact, for example, and DeLone McLean model takes into account two levels of impact, individual and organizational performance. (Gable, et al., 2003; Ifinedo and Nahar, 2006; Sedera and Gable, 2010) in their models on the success of the extent of ERP, they take into account three levels of impact, the individual impact, 'workgroup impact and the impact of the organization to evaluate the success of the ERP system. Finally Davis in his model of technology acceptance model TAM takes into account a level; individual impact to assess the user perception and behavior.

##### *2-4-1- Acceptance Model Technology TAM (Davis, 1989)*

This model has been widely used in the information system and considered one of the main theoretical foundations (King and He, 2006). TAM has proven to be one of the most powerful models to explain user acceptance of the technology and user behavior (Wu et al., 2011). Davis says that the use of technology is determined by two factors, perceived usefulness and perceived ease of use, this individual impact is the main purpose of the technology acceptance model. Many studies apply this model to understand the behavior and attitude of the users of the ERP system and assess the satisfaction following use of the system, measuring the latter to use the ERP system is CST Computer Self-Efficacy (Bradford Florin, 2003; Kwahk and Lee, 2008; Scott and Walczak, 2009).

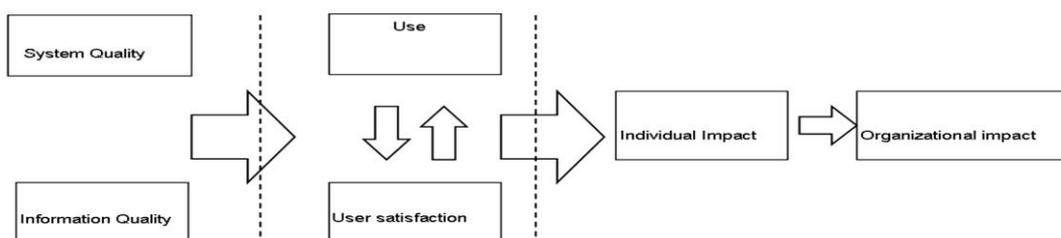
#### 2-4-2- DeLone and McLean model of success

D & M is the model city in the success of the information system (Kronbichler et al, 2010; Sedera and Gable, 2010); it is one of the most famous models adopted by researchers to measure success the information in the last two decades system. (Seddon, 1997) in his article respecification Extension and D & M Model of the SI, criticized this model about the inclusion of both causation and process interpretations, which lead to the significance of the confusion reduce the value of the model (Seddon, 1997). DeLone and McLean have updated their model based on these criticisms (Delone and McLean, 2003). Despite this update their model, the first version adopted and remains the most cited in the literature review is a success.

The strength of D & M model is its theoretical foundation based both on Shannon & Weaver communication theory and communication systems approach Mason (Mason, 1978; Weaver and Shannon, 1949). They claim that information is considered as an output of an information system that can be measured at three main levels: technical, semantic level and efficiency, referring to the mathematical theory of communication (Weaver and Shannon, 1949) and its levels to analyze the message following the communication system. Defining and measuring the output of any system is always difficult, especially if the output is rather intangible nature. Information output is represented in symbolic form, the concept of signs is essential to both the information and communication; it is considered a single system the key link in the way affect the other, and involves the system context and the sign its self (Mason, 1978)[13].

Based on these theoretical foundations, D & M developed six categories or aspects of information system that will become the construction of their separate model, these constructions are: system quality (SQ), information quality (IQ) USE, user satisfaction, individual and organizational impact. These variables are most adopted in measuring the success of information in the last two decades system. However, the problem is the model building that tries to combine both causal processes and explanations of IS success (Seddon, 1997) [14]. The result of the combination of variance and process model is that a lot of boxes and arrows may have both a variance and an event in a process of interpretation, giving a feeling of different parts of the model will cause slippage of a direction arrow in a box or another (Seddon, 1997), the subsequent claim that the major difficulties with D & M model can be demonstrated by drawing attention to the use as a construction. This box can take three possible meanings: as a variable that proxies for the benefits of using as the dependent variable in a model variant of the future is to use and thirdly as an event in a process leading to the individual or organizational impact.

Figure 1: D&M IS Success Model (Delone& McLean, 1992)



Seddon shows the meaning of the categories in DeLone & McLean model is successful, and explains the combination of three types:

- A model of the variance is success, where quality system and quality of information are considered as independent variables and the dependent variables are the East use and user satisfaction.
- The second model is a variance model to use as a behavior, which can take a second meaning, is to use.

- The third model is a process model, where the use is considered an event necessarily precedes the following constructions: the user satisfaction, individual impact and organizational impact. (Seddon, 1997).

Beyond the combination of the two dimensions of causality and processes to explain the construction and confusion in the direction of D & M model (Seddon, 1997) other considerations would occur as the level considered to explain the success of an information system and the impact on performance. Success is the evaluation is not limited to internal factors according to D & M in their model based on the theory of Shannon and Weaver. For example the quality of the ERP system is not only a causal variable leading to success, but can also be seen as a result of other external factors, such as organization, innovation, and environmental factors (Bradford Florin, 2003; Ifinedo, 2011[15]; Sedera and Gable, 2010)[16].

### *2-5- evaluation approaches*

Many researchers have tried to understand the relationship between IT investments and performance, focusing on five main approaches for evaluating IT projects (Bellaaj, 2010) [17]. These approaches are:

- Evaluation Approach economic theory (Brynjolfsson, nd): the main objective of this approach is to understand the gap between IT investment and productivity of the organization according to certain economic criteria.

- Evaluation Approach Social Psychology (Davis, 1989a, 1989b; Venkatesh et al., 2003)[18]: beyond the economic approach, it incorporates the human factor as a key factor in the process of IT investment and impact assessment.

- Evaluation Approach Based on the analysis of competition: this approach is developed by (Porter and Millar, 1985) explains how technology affects all business. The authors outline the information technology needs to be understood more than just computers, it must be broadly conceived to encompass information that companies create and use as well as a wide range of technologies more increasingly convergent and linked this process the information in their perception of IT they adopt the concept of the value chain to explain the competitive advantages of IT investments.

- Evaluation Method based on strategic alignment: This approach is developed by (Henderson and Venkatraman, 1993), it is widely used by researchers in the information to understand two key concepts system; the first is the adequacy of the information technology goals and strategic objectives of the organization; the second is the functional integration (integration between business and functional areas). This approach suggests that the IT strategy must be consistent with the business strategy to improve organizational performance.

- Evaluation Process Approach: a new conception of assessment Is success was brought by this approach based on the theory developed by emerging process (Markus and Tanis, 2000; Soh and Markus, 1995) [20] . This approach highlights the failure of the economic model to assess the success, and proposes a new vision of evaluation not only on the input evaluation (assessment of IT investments) on the base, but also based on the use and impacts of IT, by virtue of a valuable creative process.

Three main approaches could be considered to assess the success of the ERP system; the first is based on the financial performance criteria (Nicolaou and Bhattacharya, 2006)[19] to assess the benefits of ERP (tangible benefits), the second approach is based on the non-financial approach to evaluating the intangible benefits system ERP, and the last is a mixed approach, for example to assess the ERP system, many perspectives measurement must be taken into account, such as behavioral perspective (user acceptance), the strategic perspective (alignment between strategic organizational goals and ERP), the economic perspective (cost, expenses ..) and (Fit and organizational integration of ERP system) technology perspective. These four dimensions of evaluation of ERP were treated separately in the literature on measuring the success of the ERP system.

In this section, we present two examples of evaluation approaches that synthesize the different perspectives of assessment mentioned above. First, we will propose an AHP approach to assessing performance measures ERP (Tsai et al., 2006) [21]. Second, we will introduce the Balanced Scorecard approach widely adopted by many researchers to assess the benefits of the ERP system (Chand et al., 2005; Rosemann and Wiese, 1999; Velcu, 2010).

#### *2-5-1- AHP approach to performance evaluation of ERP*

The approach AHP (Analytic Hierarchy Process approach) is to assess the relative importance weight measuring the performance of the ERP; it can be used to select key performance indicators of the ERP system, and explains the contribution of the ERP system in organizational performance (Tsai et al., 2006). This approach is applied to problems of decision making to choose the best and appropriate according to the importance of each alternative. In the case of the ERP system two stages were presented by (Tsai et al., 2006) to assess the relative importance of performance measurement of ERP. The first is to list all performance measurement ERP and assessing their importance. The second stage focuses on building a framework for analysis and AHP achieve weight relative importance of 80 ERP performance measures using a questionnaire with Likert-type scale 7 points (1 = very little importance, 7 = extremely important).

This approach focuses the post-ERP implementation phase. Based on D & M model 1992, this approach provides a new taxonomy of performance measurement: the category of quality, and class of measuring impact. Quality concerns the ERP system information, system usage and user satisfaction, impact category covers both individual and organizational levels. The result of this study shows that a company can select specific performance metrics based on three main factors: the objectives of its ERP system, and the specific needs of the business context. This means that each company must build its primary measure of performance, taking into account three main factors mentioned above.

#### *2-5-2- Balanced Scorecard approach to measuring the performance of ERP*

This approach is developed by (Kaplan and Norton, 1992)[22] to better understand and classify measures of organizational performance. They claim that the balanced scorecard enables managers to analyze business performance from four perspectives, the financial perspective, the internal business perspective, the perspective of innovation / learning and finally customer perspective. This part of BSC is widely used in management science in various disciplines to assess organizational performance. However, our focus is on using this approach to evaluate the performance put up by the ERP system. Some researchers have been interested in this question about the evaluation of the performance of the ERP system in a BSC approach (Rosemann and Wiese, 1999; Velcu, 2010). They explain how the BSC approach can be used to evaluate the performance of the company set up by the ERP implementation at both operational and strategic levels.

This application of the BSC sheds some light on understanding the three levels of ERP impact on performance at the operational level, tactical level and strategic level. These levels provide a framework for the analysis of benefits based on the strategy and organizational goals ERP system throughout the ERP lifecycle.

#### *2.6. The theoretical foundations*

First, we present our conceptual model which is based on both theoretical and empirical background. This framework will be considered a success evaluation model of ERP system that combine causal processes and considerations for evaluating the success of the ERP project in three performance levels: The individual performance, the performance of the task force and performance Organizational (and Ifinedo Nahar, 2006; Ifinedo 2011; Ifinedo et al, 2010; Myers et al .., 1997). The levels of analysis included in this model were based on three theories: the first theory is the mathematical theory of communication used by DeLone and McLean is a success model to analyze the quality of the system and its impact on quality information on the one hand, and the impact of the quality of information in the efficiency users, on the other hand; The second theory is the theory of diffusion of innovation used to analyze and classify the different factors in three main boxes: innovation factors, organizational factors and environmental factors;

and finally the theory of the structure to analyze the contribution of the ERP technology in organizational performance.

#### *2.6.1. Mathematical Theory of Communication*

The mathematical theory of communication (Mason, 1978; Weaver and Shannon, 1949)[23] explains the interaction of three factors: the information system, information such as a product and the impact of information on individual performance and organizational. This approach is used by (DeLone and McLean, 1992) in their model of success for developing sexual constructions considered the main variable to evaluate the success of the information system.

#### *2.6.2. Innovation diffusion theory*

Based on the theory of diffusion of innovation, mainly paradigm variables determining the adoption of innovation (Rogers, 1983)[24], three main factors emerged: Innovation / Technological factors, environmental factors and factors Organization. In this taxonomy, each of these factors can be explained in the context of the ERP system. These factors are extremely important in the adoption of ERP phase and they must be integrated in the process of successful ERP system (no success without adopting one hand technologies).

#### *2.6.3. Structuring theory (AST approach)*

Structuration theory associated with institutional theory Giddens social assessment has been widely applied to understand and explain organizational technology adoption (DeSanctis and Poole, 1994) [25]. We focus solely on the AST proposed by DeSanctis and Poole, 1994 to explain how technology brings productivity, efficiency and satisfaction to both individuals and organizations. This approach is based on the school of technology was applied and explained by DeSanctis and Poole, 1994 in their approach to the theory Adaptive Structuring. The ASP is considered a framework to study the variation in the change of the organization and illustrating the impact of advanced technology on organizations. It has been tested on a GDSS (Group Support System to the decision) to answer questions about how technology affects people and organizations that use it, and how it improves the performance of the working group.

We consider this approach AST as an extension of the determinant variables paradigm adopting the technology because the technology adoption is an important step in the process of ownership leading to improve performance in the top three levels (individual, group and organizational performance). (Desanti and Poole, 1994) stress the importance played by the members of the organization in the process of choosing the most appropriate technology.

### **XIII. DEVELOPMENT OF A MODEL SEARCH**

While ERP systems generate several technical problems: integration of ERP solutions with existing applications (legacy systems) or new business software (eg SCM Supply Chain Mangement, Electronic Data Inter exchange EDI ...) but mainly managerial issues regarding aspects related to the cost, the project period and company organization.

Therefore, if a company wants to incorporate an ERP system, even though its operations are not integrated, it should not, alone, buy a software package and associated computer equipment but it is called, also, to acquire know-how and establish a suitable organization of work.

Therefore, methods of effective use of ERP systems require something other than a good computer. Moreover, several companies say they face serious difficulties in the implementation of an ERP system without the technical aspects are actually involved: this is due, in fact, to disregard and neglect human and organizational factors (Anonyme1, 1997).

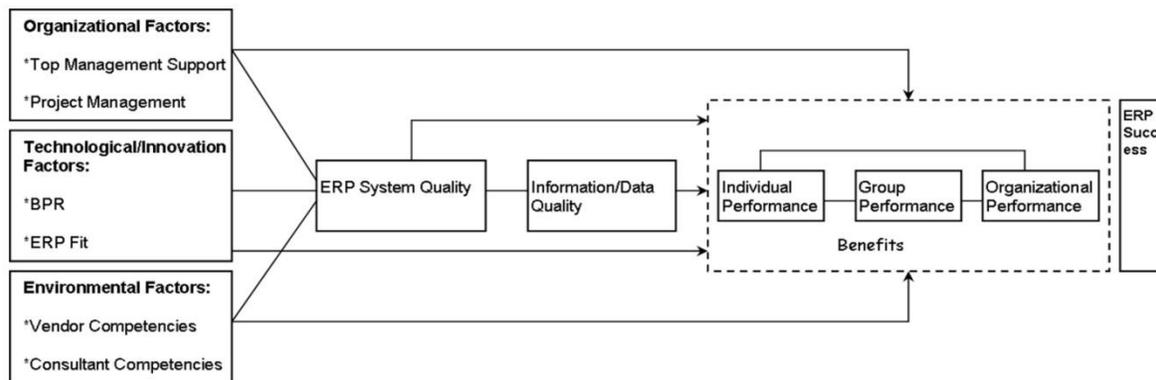
Thus, and in support of some researchers (Bancroft, 1996; Kaemmergarrd & Moller, 2000)[26], the factors considered can be classified keys to the success of an engineering change under the under the following dimensions: the involvement of management Generally, user involvement, communication management, training and the implementation strategy that includes both reengineering business processes (BPR) that the same approach of implementation of these systems.

ERP, adding a new dimension, which includes the sub dimensions listed above, turns out advisable to measure user satisfaction of the TSI, including ERP.

At the basis of this reasoning, it is assumed that an ERP system is effective at the individual level where its users are satisfied. This level of satisfaction is determined by the quality system implemented in the company, a good quality of the information it provides, high value perceived by users and good engineering changes necessary for its implementation.

Thus, the various built the model proposed for measuring user satisfaction of an ERP system, detailed below, may be diagrammed as in Figure 2.

Figure 2: The conceptual model of measuring user satisfaction of an ERP system



#### XIV. DEVELOPMENT HYPOTHESIS

This dimension has been used extensively in the literature as the dependent variable success SI. DeLone & McLean (1992) fall within a number of 33 empirical studies published between 1981 and 1987 who enjoy success in terms of user satisfaction (Bailey et Pearson, 1983; Ives, Olson & Baroudi, 1983; Doll & Torzkadeh 1988 ...).

Melone (1990)[27] stated that there is no consensus on a conceptual definition of the construct of user satisfaction. Indeed, user satisfaction has been associated with many terms such as "need felt", "acceptance of the system," "perceived usefulness", "appreciation of MIS", "feelings" (Ives, Olson & Baroudi, 1983).

In general, this satisfaction was defined by "the attitudes and perceptions" (Lucas, 1975). In specifically, this satisfaction was defined as the result of the evaluation that individuals are on continuum "content - dissatisfied" (Naylor, Prichard & Ilgen, 1980); or the sum of feelings and attitudes towards each of a variety of factors affecting the situation (Bailey & Pearson, 1983).

However, it should be noted that the definition proposed by Seddon & Kiew (1994) will be the one used for this article because the items related to the "user satisfaction" dimension of their work will be adopted. Thus, satisfaction is defined as feeling "net" of pleasure or displeasure that results from an aggregation of all the benefits that a person hopes to receive from the interaction with the information system (Seddon & Kiew 1994).

#### *4.1. Quality system erp*

This dimension is widely used in the literature (Doll & Torkzadeh, 1988; Davis, 1989; DeLone & McLean, 1992; McGill et al., 1999; etc.). It is a powerful determinant of the effectiveness of IT as well as user satisfaction. The quality of the system relates to the quality of application itself (the different system functionality, ease of use and learning). In addition, it summarizes some issues such as the lack of "bugs" in the system, the user-friendly interface, etc.

**Therefore, the hypothesis H1 states: "The better the quality of the system (ERP) is good, more satisfaction is high."**

#### *4.2. Quality of information provided by the system erp*

The concept of quality of information has been widely used as a key success factor in research in SI. In fact, this construct has been measured primarily by Bailey & Pearson (1983) and Doll & Torkzadeh (1988) as a measure among other satisfaction. This dimension usually includes attributes related to the quality of the information provided by the ERP system, such as the format of the information, clarity of information, accuracy of information, availability of necessary information in real time, the information content, etc.

Therefore, the second hypothesis H2 states: "The better the quality of information provided by the system (ERP) is good, more user satisfaction is high."

#### *4.3. Perceived utility*

This construct is defined by Davis (1989)[28] as the degree to which a person believes that the use of a particular system would increase the work performance. This dimension has been considered as a factor affecting the satisfaction of users that it comprises, on the one hand, items related to the perceived ease of use and, on the other hand, those related to the perceived usefulness. Moreover, Davis (1989) shows that the acceptance of a technology depends on perceptions of users of this technology. Indeed, the Technology Acceptance Model (MAT) assumes two types of beliefs, perceived ease of use and perceived usefulness, determine the intent of the individual who influences the use of technology.

This allows, therefore, bringing forward the third hypothesis H3 namely: "The greater the perceived usefulness by users, the greater their satisfaction is high."

#### *4.4. Quality of change*

As shown above, this new dimension can be understood by the five under following detailed dimensions.

##### *4.4.1. Involvement*

To drive change caused by the implementation of an ERP system, it is essential that this project will become the project of the entire company: from top management to operational (Mckerise & Walton, 1995; Bingi, Sharma and Godla 1999; Rivard, 2000; Tomas, 1999; etc.)

##### *4.4.1.1 The involvement of senior management*

Indeed, the leaders are not called, only to finance the project but also to take an active role in managing change (Bingi, Godla and Sharma, 1999). This role is mainly to guide the overall operation, encourage local initiative, indicate very clearly the kind of organization that wishes to establish, define the corresponding steps of achievements, etc. (Mckerise & Walton, 1995).

#### *4.4.1.2 The involvement of users*

Added to the commitment of senior management and middle management, the implementation of an ERP system can be conducted only by the involvement of the community of operational users and a user project manager full time representing the whole of this community (Tomas, 1999).

However, it is important to note that the involvement of users could not be, in itself, a prerequisite for the proper conduct of change. The latter requires, in addition, good communication management.

#### *4.4.2. Communication*

Certainly, the quality of communication within work groups plays an important role in employee attitudes towards change. Where communication and atmosphere were good, new technologies were generally welcomed with enthusiasm, while in groups where members felt compelled to comply with the new rules, reactions were much less favorable. In fact, communication is essential not only to create an understanding and approval of the establishment, but also to win the agreement of users. This communication should begin early, be consistent and continuous (Kaemmergarrd & Moller, 2000).

In addition to good communication during an implementation project of an ERP system, it is inevitable to provide training to users.

#### *4.4.3. Training*

Training is seen as an important factor to facilitate change in the organization and introduction of new technologies (Mckerise & Walton, 1995). This training aims mainly to prepare staff and help them adapt to their new tasks in order to be successful organizational change. It is not intended; only use new systems but also the understanding of new processes and their integration into the system. Hence, training is an ongoing process and updating a challenge (Bingi, Godla and Sharma, 1999).

#### *4.4.4. The implementation strategy of an ERP system*

The implementation of an ERP system means a continuous learning cycle in which the organizational process supported by ERP systems is aligned gradually with the company's goals. Lequeux (1999) says: "Far from leading a purely IT project, the adoption of ERP should be an opportunity to reconsider the mechanisms and improve the flow participating in the operation of the business, even to consider a business process reengineering or BPR, Business Process Reengineering".

##### *4.4.4.1. The Business Process Reengineering (BPR)*

Moreover, the re-engineering of business processes and implementation of ERP systems are inseparable. They should be carried out simultaneously in order to obtain the best fit between the technologies and processes. This adjustment requires considering the role of ERP systems such as infrastructure, which now support the process and no longer functions and, therefore, improve their organizational effectiveness.

##### *4.4.4.2. The ERP system implementation approach*

Akkermans and Helden (2001) have focused on ERP systems implementation approach while trying to show that the incremental approach, scalable, based on continuous improvement is a key success factor in the implementation of a project ERP. They add that users of an ERP system are less satisfied if there was a radical approach (Revolutionary) that this approach results in a rigid management style based on a high degree of control and command, Intensive use of external experts, even non staff involvement and therefore a loss of skills and know-how internally. Thus, and from the previous development on engineering changes, it was agreed to present the hypothesis H4 on this new dimension, "the higher the quality of engineering change is good, more user satisfaction is better".

This hypothesis derived secondary hypotheses for sub dimensions of engineering change. They are formulated as follows:

- H4a "More DG is involved in the project implementation of an ERP system, more user satisfaction has increased."
- H4b: "More user involvement, the greater their satisfaction is high."
- H4c: "More communication is good, most users are well satisfied."
- H4d: "More training is good, more user satisfaction is very high."
- H4e "The incremental implementation approach can increase user satisfaction more than the radical approach."

## V. RESEARCH METHODOLOGY

Once part of the research is defined and the variables of the research are identified, it is important to conduct data collection. For this, a questionnaire, multi-scale, was built and tested with users belonging to both different hierarchical levels as various services, and finally administered face to face in Moroccan companies.

Given that companies have adopted ERP systems are not numerous, it was not possible to focus on a specific industry. The selection of the study population was guided by a single criterion, namely: the existence of an ERP system that is already operating at all levels (all modules are already functional) or at least a good part of the system east.

The different ERP vendors (Oracle Applications (Oradist), MFG/Pro (DISCOVERY) ADONIX X3 (STAR ENGINEERING), JDEdwards (LPI)) are chosen as the starting point for the definition of the population.

Data collection has collected a sample of 40 companies surveyed; representing an effective response rate (60.45%). However, it should be noted that the unit of this study is defined as the user of an ERP system. Therefore, the respondent is either the project leader or the leader or one of the senior or middle managers, or one of the last entry clerks. What mattered was the use of the ERP system.

## VI. RESULTS AND INTERPRETATION

It is important to note that the measurement scales were either adopted from previous work or created for the need of this research.

### *6.1. Descriptive analyzes of research variables: evaluation of measures*

After proposing measures to the various concepts identified in the model and collected the data from the selected population, it is appropriate now to ensure the quality of these measures before making adequate statistical treatment. To do this, we made two types of tests for evaluating the measures namely: tests

On the dimensionality and reliability test (Cronbach's alpha) (Evrard, Pras & Roux, 1997). Through these purification tests, which are based on principal component analysis ACP was determined for each building its KMO MSA and each of its items.

So we tried to conclude whether built or not is one dimensional and to specify the contribution of each item to the formation of the factor. Finally, we calculated, for each cleared factor, Cronbach's alpha.

## 6.2. Explanatory analyzes of research

Once the measures have been evaluated and the new structures are identified, we proceeded to test hypotheses. This part, devoted to the operationalization of the model and test hypotheses, has identified the following results.

Results thus obtained confirmed the work of DeLone & McLean and those Seddon & Kiew. These results have shown that this satisfaction is explained:

- Primarily by the quality of the system, the quality of information provided by this system and the utility perceived by the users;

- Partially by the quality of engineering changes needed to implement the ERP system. It is true that the data analysis performed could provide only partial verification of this dimension engineering change because, firstly, user involvement, communication and training partially affect that satisfaction on the other hand, the other two sub-dimensions i.e., the involvement of the DG and the implementation strategy does not seem to affect the satisfaction.

It is important to note that future research should be directed towards the new way of "Management Information Systems": evaluating the success of ERP systems. In addition, we can consider further use of research variables in this model. It seems necessary to consider a more precisely the concept of "quality of engineering change," or override variables to study to eliminate those that are redundant and introduce other variables, such as those relating to culture, user profiles, etc.

So it will be wise to take this model while increasing the sample size to allow better analysis to improve results. This should be possible since the number of Moroccan companies that are in the process of implementing ERP systems is increasing.

## CONCLUSION

The implementation of an ERP decomposes different things, which is three time horizons: the front project before implementation of the ERP project: during the implementation of ERP and after project after the failover, ownership of ERP.

Given the rapid spread of integrated software packages in the industrialized world, and minority of scientific publications that provide potential answers to questions on the ERP, a research that helps to explain, prior to the implementation of an ERP and its impact on company performance is probably beneficial for academics and professionals to be more successful the implementation of this new innovation.

In conclusion, it should be noted that in our time, "The information system has become the cornerstone of consolidating the company's strategy" (Baumard & Benvenuti, 1998). Thus, the IS manager is asked "to provide future solutions enabling the company to be more competitive. It is no longer to increase productivity but to provide the general direction the technological know-how through which the company will be able to adapt its service to the needs of its customers while controlling costs "(Baumard & Benvenuti 1998).

Through this article, it is important to note the prominence that ERP systems are currently in Moroccan companies. In fact, these integrated management systems, which are increasingly "backbone" of the SI of the company, need special attention, including in their implementation and evaluation.

Closer to the work of the "Management Information Systems" relating to the determinants of success of IF including the determinants of user satisfaction, the results of this research show that the dimensions outlined in previous studies (Quality System, quality of information and usefulness) remain well determinants of user satisfaction of an ERP system.

However, the current trend concerning the implementation of ERP systems shows that user satisfaction of a SI especially those ERP systems increasingly depends on more than one dimension as well as organizational managerial: he s 'comes to engineering change. Indeed, it seems that there is an increased importance of the effort required in order to conduct an implementation project of an ERP system, mainly in terms of user involvement, communication and training.

This attempt to develop a new model of success of the evaluation of the ERP system is motivated by the need for businesses to justify and understand their investments in this kind of information technology project. Draft ERP system should not be regarded only as a project of upper management, but a project of organization that integrates all actors and stakeholders, for this reason, in our model of assessment of the success of the ERP system, we take into account the role of all partners and actors of different level of analysis and different phases of the integration of the ERP project. Three categories of assessment factors have been proposed: the organizational factors, environmental factors, and technological factors. These factors are crucial to assess the success of the project of ERP system; they contribute significantly to understanding the process of the success of the ERP system. The organizations should give more attention to these factors for their successful project of information system and to obtain a high quality system, accepted and used by the employees. As emphasized in our model the success should be evaluated from three main levels of analysis: at the individual level, at the level of the group and of the organization

This research work provides a new tool for the practitioners by allowing them a better understanding of the project of success of the ERP system. The managers of the information system, the direction, and the ERP users need to understand the implication of their actions in the process of success and how they contribute to the improvement of performance. Thus, this work seeks to highlight the suppliers and consultants contributions to perform the ERP project. To cope with more than three-quarters of ERP project fails, organizations must be able to assess their information systems projects. This need led us to investigate this issue by developing a new model that explains the relationship between the partners of the ERP on the one hand, and to propose the main evaluation factors to assess the success of the ERP project.

Notwithstanding, the results presented are limited to enterprises in the sample and should be interpreted with caution in view of the nature and structure of the sample, but also the data collection methods used.

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## AUTHOR(S) BIO



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Since 2007 to today, I have tried to diversify my professional experience in my specialty area through several positions but now I look after the position of financial manager

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Currently, I work on a thesis project that addresses the following research problem: "the impact of the implementation of the ERP on the satisfaction of end users," discusses this topic: your perception of ERP, L accompaniment in the use of ERP, Your satisfaction as users of the ERP, and finally the importance and role of ERP for the enterprise. Diverse and varied studies are devoted exclusively to answer my research aspects in demonstrating its importance in my research fields.

For your information, I have participated in several international conferences and scientific events either in Morocco or abroad, so I presented two scientific papers and a poster.

# Creare Mediterraneus

## searching the roots in a digital way

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**Abstract:** *Creare Mediterraneus* is a project developed by Economia Creativa Consultancy<sup>1</sup>, spin-off from ‘Reinventing Costa del Sol Through Creative Tourism’ project. It aims to encourage social innovation through exchange of ideas and creative thinking, harnessing new ways of developing the synergies between art, culture, economics and technology in order to find solutions to the challenges that the Mediterranean -and Humanity- is facing: immigration, inequality, global warming, mass tourism, unemployment, lack of perspective for youth, to cite some of them.

The aim is to raise awareness among local entrepreneurs, artists, creative people, humanists (philosophers, anthropologists, historians) and policy makers about the opportunity of creating new ways of working: multifunctional, multi-sectorial, multicultural and multinational mixing creativity, economy, culture, art and technology for their development and the development of the Mediterranean Region in a sustainable and innovative way.

*Creare Mediterraneus* is an online platform for the Creative Economy<sup>2</sup> in the Mediterranean Region promoting the networking, exchange and dialogue among entrepreneurs, artists, cultural managers, museums and cultural institutions, public authorities and other actors.

We aim to contribute to the international debate for developing an alternative economic system considering creativity, people and the environment at the center of it. The #CulturalEra

**Keywords:** creative economy, digital platform, entrepreneurship, social innovation, training and coaching, youth empowerment

## XV. INTRODUCTION

This paper aims to present *Creare Mediterraneus*, a platform for boosting creative economy in the Mediterranean region however, first it is important to briefly describe the context in which this project has been conceived.

Nowadays, the Mediterranean region faces many challenges both in the North and in the South side. It is a heterogeneous and culturally diverse area, although with cultural, economic and historic interrelation and heritage.

In the North side, particularly in Spain, Italy and Greece, aging population, lack of perspective for young people, high youth unemployment (figure 1), brain drain, the financial crisis, migration, tourism seasonality and difficulties to adapt to the new way of living, working and producing as a consequence of

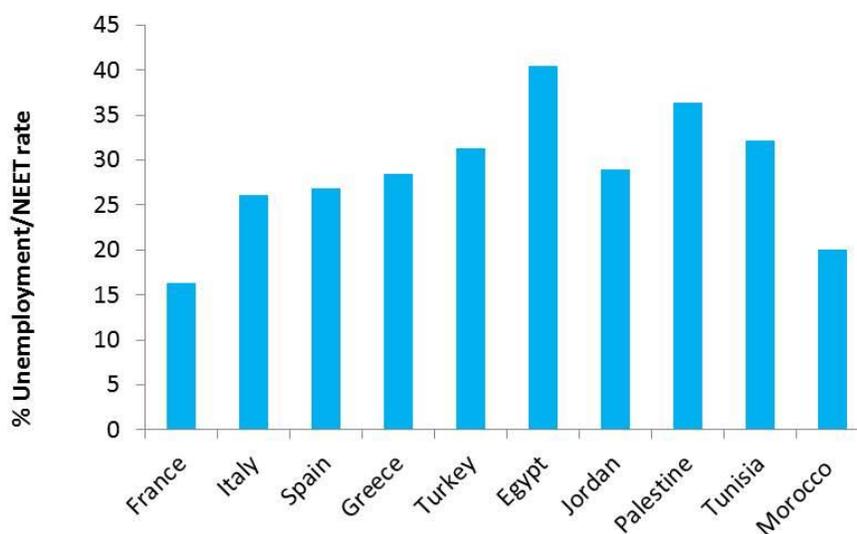
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<sup>1</sup> [www.economiecreativa.eu](http://www.economiecreativa.eu)

<sup>2</sup> UNESCO 2013, Creative Economy Report: Widening Local Development Pathways

the Information Communication Technologies (ICT) and its impact in the economic and social model are the main challenges.

In the South, the Arab Region<sup>3</sup> suffers from scarcity of resources, low development levels, one of the highest percentages of youth in the population in the world and of youth unemployment (figure 1), migration and brain drain and internal conflicts implying that many people have to abandon their homeland, becoming refugees many of them, and migrate to other countries, often to the European Union, recently mainly to Germany.



Source:

**France, Italy, Spain, Greece and Turkey:** OECD, Youth not in employment, education or training (NEET), age 15-29, (2013)

**Egypt, Jordan, Palestine and Tunisia:** NEETs rate among young people age 15-29, (2012-2013) / Raport: 'THE CHALLENGE OF YOUTH EMPLOYABILITY IN ARAB MEDITERRANEAN COUNTRIES, THE ROLE OF ACTIVE LABOUR MARKET PROGRAMMES'

**Morocco:** Unemployment rates in youth population age 15-24, (2013) Raport: 'THE CHALLENGE OF YOUTH EMPLOYABILITY IN ARAB MEDITERRANEAN COUNTRIES, THE ROLE OF ACTIVE LABOUR MARKET PROGRAMMES'

Figure 1. Unemployment/NEET percentage rate in the Mediterranean Region

As we see, both sides of the Mediterranean basin face multiples challenges, however the high youth unemployment rate, the lack of perspective among young people and brain drain due to the migration mainly to Central Europe, UK and Nordic Countries are common in both sides.

In this context, the traditional economic model, for example in tourism<sup>4</sup>, has proved insufficient to create the opportunities that young people and society need: the ecosystem and the culture that can enable business creation and innovation to flourish in the digital age. New economic sectors such as the creative economy that has proved resilient to the global recession have to be developed<sup>5</sup>. *Creare Mediterraneus*, a spin-off from *Reinventing Costa del Sol Through Creative Tourism*<sup>6</sup> project by Economía Creativa

<sup>3</sup> Yusuf Mansur in *Creativity, Innovation, and Development, 2015*, reviews the Doing Business and Competitiveness indicators in the Arab Region

<sup>4</sup> Maxime Weigert 2012, *The Challenges of Tourism in the Mediterranean Region*

<sup>5</sup> *The Economic Impact of the Creative Industries in the Americas*, a report prepared by Oxford Economics for the British Council, IDB, OAS

<sup>6</sup> A.C. Ruiz Soria, J.E. Molendowska (2014), *Reinventing Costa del Sol Through Creative Tourism*

Consultancy included at OECD LEED Forum on Partnerships and Local Governance<sup>7</sup>, aims to contribute to the development of a more creative, innovative and entrepreneur Mediterranean Region by promoting entrepreneurship culture, providing training, showcasing entrepreneurs projects, accelerating start-ups, mentorships, open calls for young artists, creating a network of hub organizations in the whole region and beyond for the dissemination and co-creation of activities.

## XVI. Why an online platform for boosting creative economy in the Mediterranean Region?

The Mediterranean basin faces many challenges, however we can ask ourselves why an online platform for boosting the creative economy in the Mediterranean basin?

The Mediterranean Region is rich in art, traditions, cultural heritage, history, gastronomy, has a particular notion of time, a lifestyle, and to sum up, a cultural identity<sup>8</sup>.

**Creative Economy:** The term refers to the socio-economic potential of activities that trade with creativity, knowledge and information. Governments and creative sectors across the world are increasingly recognizing its importance as a generator of jobs, wealth and cultural engagement. At the heart of the creative economy are the cultural and creative industries that lie at the crossroads of arts, culture, business and technology.

Source: British Council 'What are Creative Industries and Creative Economy'  
[http://creativecities.britishcouncil.org/creative-industries/what\\_are\\_creative\\_industries\\_and\\_creative\\_economy](http://creativecities.britishcouncil.org/creative-industries/what_are_creative_industries_and_creative_economy)

Figure 2.- Creative Economy: Definition

According to UNESCO (2013), 'Culture is a driver of development, led by the growth of the *creative economy* (figure 2) in general and the *creative and cultural industries* (figure 3) in particular, recognized not only for their economic value, but also increasingly for the role in producing new creative ideas or technologies, and their non-monetized social benefits. Culture also enables development. It empowers people with capacities to take ownership of their own development processes'. 'When interventions in fields such youth engagement takes the cultural context into account, transformative and sustainable change can occur.' And that is exactly what *Creare Mediterraneus* aims: the transformation of the Region into a creative place, a creative destination, a creative reference in different fields: film, music, creative tourism, arts and crafts, cultural heritage, etc. Empirical data proves that the creative economy is underdeveloped, especially in the Arab countries<sup>9</sup>, but not only. Therefore there is a potential for

<sup>7</sup> [http://www.oecd.org/leed-](http://www.oecd.org/leed-forum/database/localdevelopmentprojects/spain_reinventing%20costa%20del%20sol%20through%20creative%20tourism.pdf)

[forum/database/localdevelopmentprojects/spain\\_reinventing%20costa%20del%20sol%20through%20creative%20tourism.pdf](http://www.oecd.org/leed-forum/database/localdevelopmentprojects/spain_reinventing%20costa%20del%20sol%20through%20creative%20tourism.pdf)

<sup>8</sup> Affaya Rim 2009, *Unity and Diversity in Euro-Mediterranean Identities: Euro-European and Arabo-Mediterranean Dimensions*

<sup>9</sup> Najib Harabi (2009), *Creative industries: case studies from Arab countries*

developing creative economy in the region, including the regeneration of the tourism industry into a creative tourism business model<sup>10</sup>.

**Creative Industries** - 'those industries that are based on individual creativity, skill and talent with the potential to create wealth and jobs through developing intellectual property'  
Includes thirteen sectors: advertising, architecture, the art and antiques market, crafts, design, designer fashion, film, interactive leisure software (ie. video games), music, the performing arts, publishing, software, and television and radio.

Source: British Council 'What are Creative Industries and Creative Economy'  
[http://creativecities.britishcouncil.org/creative-industries/what\\_are\\_creative\\_industries\\_and\\_creative\\_economy](http://creativecities.britishcouncil.org/creative-industries/what_are_creative_industries_and_creative_economy)

Figure 3.- Creative Industries: Definition

It can still be asked why an online platform? Very few will have nowadays doubt that in the digital age in which we live value is created through networks and platforms<sup>11</sup>. The website and social media allow almost free international transactions particularly of ideas, the raw material for creative economy. Platforms provide the opportunity of multi-sectorial, multifunctional and multi-generational interactions among different stakeholders in a constant relation that leads to peer to peer learning, exchange of best practices, added value contributions to existing projects, connecting ideas to create new visions and projects, dialogue, space for cultural diplomacy and a forum for discussion within a sector, creative economy in our case. In consequence, platforms and networks allow the creation of value and projects from bottom-up, generating more inclusive and sustainable output. Platforms normally are composed by a large number of stakeholders and users-producers of content what it generates a multiplier effect for dissemination of results and for the branding of the project itself.

In the Arab countries, the southern side of the Mediterranean Basin, according to *The Arab World Online 2014*:

*Trends in Internet and Mobile Usage in the Arab Region* report by Mohammed Bin Rashid School of Government, 20% of the internet users who responded to their survey were unemployed, 33% used English as language of preference while using internet, almost 80% has at least a university degree or higher level of education. Following ITU World Telecommunication report, in 2013 77% of Europeans households have access to internet and 34% in Arab countries where internet household penetration has grown annually by 15% between 2009 and 2013. This figures show a positive scenario for developing an online platform to empower people's knowledge, skills and competences.

<sup>10</sup> A.C. Ruiz Soria (2014) *ibid*, describe the application of the creative tourism business model to Costa del Sol, Spain

<sup>11</sup> For more insight about platform economy, see M.Kenney and J. Zysman discussion paper (draft), 2015, *Choosing a Future in the Platform Economy: The Implications and Consequences of Digital Platforms*

## XVII. Creare Mediterraneus: searching the roots in a digital way

*Creare Mediterraneus* is an online platform for boosting creative entrepreneurship in the Mediterranean Region. It was conceived by Economía Creativa Consultancy in order to apply for the NICE – Network for Innovation in Culture and Creativity in Europe- Awards 2014<sup>12</sup>, the competition consisted in solving a social challenge through an innovative project using digital technology. The Mediterranean symbolizes the *roots* of many civilizations, values, beliefs, attitudes, a lifestyle, a diet -recognized by UNESCO as immaterial cultural heritage<sup>13</sup>- acquired and share through generations. The Mediterranean is *culture*, the very source of creativity and creative industries as we have seen above. In consequence, in order to solve the numerous challenges that the Mediterranean region faces, it is needed to search these roots in a digital way by boosting creativity.

*Creare Mediterraneus* is designed to develop and strengthen the links among creative people, artists and innovators in the Mediterranean Region by online interaction, combined with onsite training and a forum for discussions. It aims to stimulate the exchange of good practices within creative economy, to impulse the exchange of ideas, collaboration, internationalization of audiences, showcase of art works and projects.

*Creare Mediterraneus* is a catalyst for creativity and innovation in the Mediterranean beyond its geographic borders. One of the key objectives is to brand the Mediterranean Region as a *creative space*. Despite the great cultural heritage and cultural potential of the Region, it is not identified yet as a creative place, due, among other reasons, to the fact that the majority of its visitors are tourists who search for resort type of holidays, sun and beaches. However even this *traditional* touristic model is showing clear signs of stagnation or even crisis, generating seasonality problems such as congestion, pollution and poor quality temporal jobs that lead to regular periods of unemployment.

At the moment, *Creare Mediterraneus* consists:

1. A web/blog, [www.crearemediterraneus.wordpress.com](http://www.crearemediterraneus.wordpress.com) (figure 4), whose aim is to clearly explain the project –in English, although with the collaboration of volunteers we can implement content in other languages-, showcase entrepreneurial projects in the creative industries and host a blog/news section for discussions and exchange of best practices



Figure 4.- Creare Mediterraneus Web/blog

<sup>12</sup> <http://nice-europe.eu/>

<sup>13</sup> <http://www.unesco.org/culture/ich/en/RL/mediterranean-diet-00884>

2. Facebook Page –although other social media such as Twitter will be added- in which disseminate the platform content, projects and activities, interact through more informal debates and build a network of fans and active followers (<https://www.facebook.com/crearemediterraneus/>, figure 5)



Figure 5.- Creare Mediterraneo Facebook page

*Creare Mediterraneo* has the following *objectives*:

- Boosting creative & digital economy in the Region
- Promote entrepreneurship culture and support young entrepreneurs and start-ups
- Provide trainings on key competences for entrepreneurship and creative economy
- Branding the Mediterranean Region as creative space
- Develop an active network of stakeholders to create value, dialogue and cultural diplomacy
- International cooperation and projects development
- Mapping the creative economy and creative industries in the Mediterranean basin
- Promote the *Mediterranean lifestyle* through art, creativity and innovation

How will *Creare Mediterraneo* work in practice?

*Creare Mediterraneo* Platform implies the participation of multiple stakeholders (figure 6) in a cloud way, actively interacting with each other in order to exchange ideas, create value, develop projects, disseminate results, evaluate activities, identify needs and design solutions to transform creativity into *innovation*.

The main stakeholders will be *young people, creatives & artists* who will benefit from the trainings, the opportunity of interacting with international organizations, youth associations, institutions, etc., and the support for establishing and promoting their start-ups or social entrepreneurship projects. *Hub organizations*, for example cultural foundations, development agencies, NGO, international institutions or government bodies, have an important role in order to disseminate the projects, collaborate for the organization of trainings, events and fora, contribute to funding activities/projects or facilitate the access to alternative funding (crowdfunding, donations, etc.).

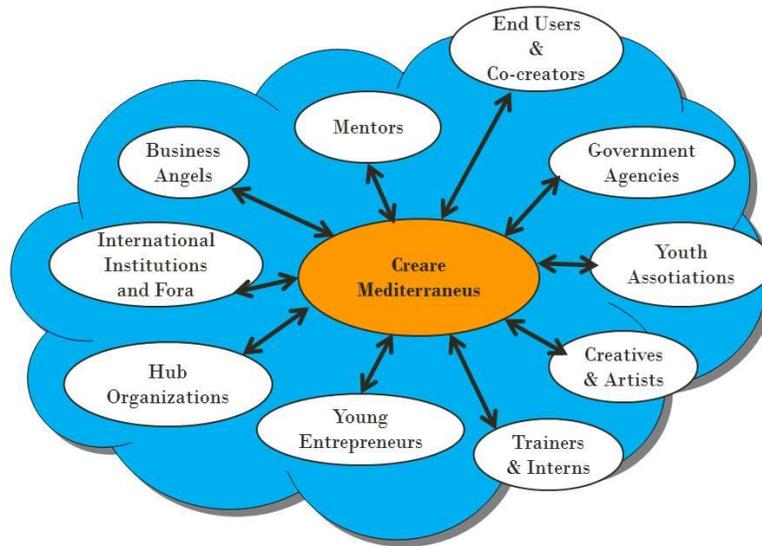


Figure 6.- Creare Mediterraneus Platform & Stakeholders

Creare Mediterraneus *activities* cover different areas (figure 7):

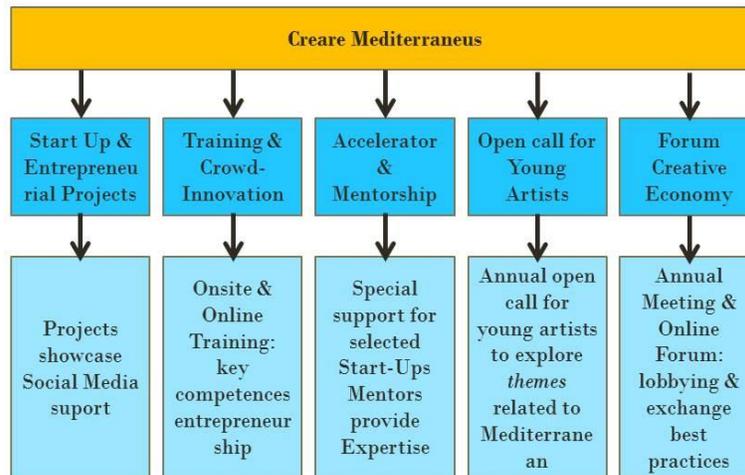


Figure 7.- Creare Mediterraneus areas of activity

- 1) *Projects/Entrepreneurial Start-ups*: The platform is initially a web/blog in which young people aged 18-35 years old preferably –although it is also open to the participation of people from other age groups if their projects are related to youth empowerment- can showcase their entrepreneurial ventures on the website simply by sending an email with a project picture/logo, a brief description in English and links to the social media of the project/entrepreneurial venture. It will be uploaded on the web by *Creare Mediterraneus*' team. Once critical user base is reached or enough financial means raised, a log-in system will be implemented in order to facilitate self-management for each project's microsite.

- 2) *Crowd-innovation and training.* Creare Mediterraneo will offer entrepreneurs, SME, start ups, public authorities, NGO, artists and creatives trainings, coaching and co-creating experiences through focus groups and workshops to develop experimental and hybrid research methodologies with a holistic approach building knowledge in a crowd way, from bottom-up, through multidisciplinary and multisectorial perspective developing public-private partnerships. It is essential the collaboration of Hub organizations and financial support from public grants, sponsorship, participants fees and/or public subsidies, in order to deliver trainings mainly -but not only- for young people to develop competences such as:
  - a. Self-management, personal branding
  - b. Team building
  - c. Project development
  - d. Funding, alternative funding and crowdfunding
  - e. Pitching and presentation skills
  - f. Social media, storytelling and marketing strategy
  - g. Business planning
  - h. Internationalization
  - i. Creativity development and innovation
- 3) *Accelerator and Mentorship Programme.*
  - a. *Accelerator:* An annual open call will be published for entrepreneurial projects and start ups within Creative Industries that will receive personalized support and mentorship services for accelerating their development. Advice will be provided to the selected start-ups for accessing to seed finance and business angels or for organizing crowdfunding campaigns.
  - b. The *Mentorship* programme will be in an ongoing basis and open to professionals with key expertise in creative industries, digital economy, entrepreneurship, innovation and international cooperation who would like to work *pro-bono* to help the development of young people in the Mediterranean region through practical advice, strategic thinking, leads, etc.
- 4) *Art open call:* an annual call for original artworks *inspired* by an annual *theme* related to the *Mediterranean* will be organized for young artists from the Mediterranean Region to present their works. The selected artworks and projects will be curated and exhibited in *Creare Mediterraneo* web/blog and its social media.
- 5) Through *Innovation Camps* (Social/Business) we offer intensive 2 to 3 days workshops where entrepreneurs, SME, public authorities, creative people, students, etc. are presented with a innovation challenge (about any aspect: business, social, cultural, development, etc.) to generate businesses/case models to solve it.

*Creare Mediterraneus* will be funded as shown in figure 8:

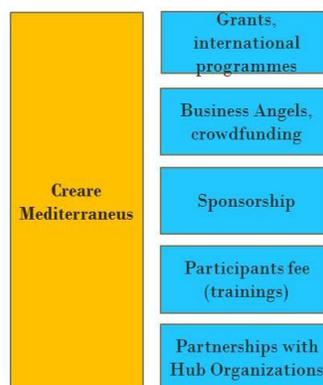


Figure 8.- Creare Mediterraneus funding sources

There are numerous grants and international programmes for which digital platforms for boosting creative economy such *Creare Mediterraneus* can apply: the Creative Europe from the European Commission<sup>14</sup>, the UNCTAD Creative Economy Programme<sup>15</sup> or the British Council Creative Economy programme<sup>16</sup> among others.

We expect to count for this project with civil society participation through donations, business angels to support creative entrepreneurs and crowdfunding campaigns for particular actions such the annual forum. Institutional or commercial sponsors will be an important source of funding for *Creare Mediterraneus*, however all sponsors will have to align to our mission and *ethos*.

Fees from participants in trainings and workshops will be other source of funding for Creare Mediterraneus although participants in unemployment or other exclusion situation will be exempted of any payment for the trainings or activities.

Being *Creare Mediterraneus* a platform, a network of networks, it has to rely in partnerships and solid and long lasting relationships with hub organizations in the different countries and regions of the Mediterranean basin. Their contribution to the project's funding can be directly –by covering the expenses for some of the trainings or workshops- or indirectly by contributing with their premises or assisting to the organization and delivery of *Creare Mediterraneus* operations as well as in the dissemination of the results (which it has an unvaluable implicit cost if accounted as marketing and promotion).

<sup>14</sup> [http://ec.europa.eu/programmes/creative-europe/index\\_en.htm](http://ec.europa.eu/programmes/creative-europe/index_en.htm)

<sup>15</sup> <http://unctad.org/en/Pages/DITC/CreativeEconomy/Creative-Economy-Programme.aspx>

<sup>16</sup> <http://creativeconomy.britishcouncil.org/>

## XVIII. CONCLUSION

The Mediterranean basin is facing many challenges. Traditional development models have proved insufficient to find solutions, as we have seen in the case of tourism. Therefore, *Creare Mediterraneus* aims to provide a new platform for the development of creative and digital economy in the region, harnessing creative entrepreneurship particularly among young people, mapping creative industries and branding the Mediterranean region as a creative place. In order to achieve this ambitious objective, we seek to build a solid international network of stakeholders (hub organizations, investors, partners, volunteers and collaborators) to contribute to *Creare Mediterraneus* platform and disseminate its vision: searching the Mediterranean *roots* in a digital way.

## ACKNOWLEDGMENT

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