ANALYSIS AND IDENTIFICATION OF ENTREPRENEURIAL OPPORTUNITIES IN CONSTRUCTION INDUSTRY USING COMPOSITE TECHNOLOGY

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Abstracts

The present research studies the composite technology in construction industry as a platform for entrepreneurial activity. Due to the importance of using composite technology and its important role in job creation, economic growth in construction industry and simultaneously its potential profitability, it shows an untapped market for Iranian entrepreneurs that tend to create added value and active participation of SMEs. Due to the lack of entrepreneurial researches in this context, conducting a research to form a scientific approach in this industry is essential. The research method was a combination of structured and semi-structured interviews and analysis and investigation of environments, needs, obstacles and results of the interviews, a questionnaire was prepared by certified teachers and was answered by a population by 70 experts and engineers. And it became the basis for identifying opportunities in this industry. According to the conducted analyses and investigations and with executions and performance of programs such as "Laws and Regulations", "Standards", "Culturalization", "Notification", "Quality Raise", "Costs Reduction", "Books Publication", "Advertising", demands for start-up businesses in this regard can be facilitated and identified opportunities cab be analyzed and evaluated.

Research paper

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Introduction

Identifying opportunity is one of the key components of the entrepreneurial process and one of the main factors of the survival and success of entrepreneurs. By reviewing and summarizing these analyses, it can be understood that identifying opportunities can also be the result of analysis and research as well as recognition. In this fast- food and quick-changing world of today, every country needs to identify opportunities permanently in order to achieve economic development. How and when one can access an opportunity seems to be quite natural. An entrepreneur realizes the opportunities around them and can create and change them (Chang, 2003). Kirzner (1969) believes that entrepreneurship means an awareness of the profitable and undiscovered opportunities. Now, according to gathered estimations, the total population of Iran is growing and increasing employment through the development of technologies related to composite materials is quite effective (Farsi et al., 2014). On the other hand, the need for housing among those who were born in 60s and afterwards due to formation of family and becoming independent can be felt more than ever. The need to retrofit buildings against earthquakes, damages to historic buildings, the need to reduce costs, protection of the environment and …. has made composite technology more prominent than ever. Composite is a class of advanced materials that:

- is made of a physical mixture of two or more materials together in macroscopic scale in order to create new materials with superior mechanical and physical properties,
- Ingredients retain their properties are not resolved with each other are mixed with each other (A group of authors and translators of Iran Composite Association, 2008)

Irrefutably, it can be stated that the production of composite materials in the country leads to employment and income generation, because by construction and launching of production lines of this product, a considerable human resource begins working and a good revenue can be attained. Considering the status of the construction industry in Iran and the high volume of demand in this area, the role of composites in creation of employment and entrepreneurial opportunities becomes more prominent. Therefore, the purpose of this study was to investigate the barriers, identification and analysis of entrepreneurial opportunities that composite technology can be applied at the level of firms and construction companies in different parts of their activities that would lead to the creation and launch of businesses, job creation, national wealth generation and self-sufficiency in the production of raw materials for this product and so on.

Literature Review

Regarding the originality of the subject of the research about the field of literature "Identification of entrepreneurial opportunities in the construction industry using composite technology", many a great researches were carried out in Persian and English sources, but no resource could be found that directly dealt with this subject. This indicates novelty of the field and lack of resources for research. Therefore, research literature was divided into three parts: 1) Research literature on entrepreneurship 2) Research literature in identifying entrepreneurial opportunities and 3) Research literature in the construction industry using composite technology. Entrepreneurship is an opportunity-centered management of production resources. Identifying op-

portunities is one of the most important skills of entrepreneurs' characteristics (Mousavi, 2008; Jones, 2013).

Two types of entrepreneurial discovery are discussed here: the conventional and non-conventional. In terms of mental structures of conventional discovery, an interpretation is banal that the entrepreneur tries to profit by doing something better. This type of discovery tries to change the status quo. Unconventional discovery is an advanced interpretation which includes events with new dimensions. Entrepreneurs create the opportunity of profitability by doing something more efficiently and differently. Unconventional discovery is followed by a conventional change in economy. 1) Why do companies grow horizontally? 2) Why do social systems prevent discovery and the entrepreneurial consciousness (Fu-lai yu, 2001). Personality characteristics of entrepreneurs, social networks and prior knowledge have been identified as the consciousness of entrepreneurs in job opportunities. Entrepreneurial consciousness in turn, is a necessary condition for the success of the triple group to identify opportunities: recognition, development and evaluation (Ardichvili, 2001; Sarjana, 2015).

Entrepreneurial activity depends on the interaction between the characteristics of opportunity and those who find them. Opportunities are objective, however, their understanding is subjective. Due to the fact that economy changes and remains in a state of imbalance, the opportunities will appear where people can convert resources into a special form. These people believe that these opportunities will create higher value than cost. The entrepreneurial process starts through understanding the opportunities and situations that could lead to interest. Alert people who are called entrepreneurs explore these opportunities and develop ideas to sell, and entrepreneurs take

hold of resources. Organizations and other types of development design opportunities and develop utilization of opportunities.

Four criteria for measuring success and failure of entrepreneurs are what follows: Survival / Growth and Employment / Income / Completion of initial public offerings. Successful and unsuccessful entrepreneurs have different practices discovering opportunities. There are two main reasons that some people discover opportunities before others: Better information / Use of the information. There are three ways to collect data: Life experiences / Social networks / Search Processes. Three personality factors that allow people to use information are: Absorptive Capacity / Awareness / Cognitive Abilities. Opportunities are usually created out of changes in the environment in which entrepreneurs work and these changes create an imbalance that entrepreneurs can exploit. Shin quotes that innovation is the key to entrepreneurial strategies that protects against imitation of company (Casson, 2005).

The definition of opportunity is important because it is the first step in the entrepreneurial process. In general, it is important to understand why some people and not all identify entrepreneurial opportunities? Recent researches focus more on the character-based attitudes. In other studies, it became obvious that men and women apply their unique ability in identifying opportunities, however, they have different processes for identifying opportunities. Based on the findings, type of entrepreneurial opportunities is related to the process of entrepreneurial discovery and prior knowledge (Smith & Matthews, 2009). Identifying opportunity has been accepted as a key aspect of the entrepreneurship process. Discovery of entrepreneurial opportunities requires that people seek information from various sources. In field of

information search and identifying opportunities, personality traits and characteristics of information seekers and communication resources can be focused on the four communicational features: 1) Knowledge 2) Emotional Support 3) Validity of 4) Trust (Zhang, 2007).

Identifying opportunities is a powerful force in the process of entrepreneurship, which specifically depends on the creativity of entrepreneurs to recognize potential or latent entrepreneurial opportunities. Applying opportunity identification and entrepreneurial creativity reveals four new risk: "Inactive", "Creativity-oriented", "Opportunity-oriented" and "Passive". Entrepreneurship is seen as encouragement of opportunity regardless of currently controlled resources. In addition, identifying promised opportunities is a key feature for new successful ventures. Entrepreneurs should also have the ability to recognize opportunities and take advantage of internal and external resources to perform better and have a long survival (Chen & Yang, 2008).

Concentration on metacognitive processes enables entrepreneurs to think beyond the knowledge and reorganization of structures and mentalities and promote understanding of the logic in making decisions in conditions of uncertainty. Many entrepreneurial researchers regard opening the vast landscape of entrepreneurial knowledge necessary to fully understand the relationship between performance and knowledge in an entrepreneurial environment. Linking the cognitive approach to present attitudes (cognitive perspective on entrepreneurship) enables the possibility of studying basic aspects of entrepreneurship (Haynie & Shepherd, 2010). Opportunities may be out of luck or well-evaluated research, they may be discovered or created. Combining these two processes will lead to four types of processes: Discov-

ery of opportunity, Looking for opportunities, Creating opportunities and Occurrence of opportunities (Alsos, 2004).

Identifying opportunity as a pattern recognition model suggests a process through which people immediately receive patterns among seemingly unrelated events or stimuli which due to their similar knowledge structure, individuals perceive patterns of apparent changes in technology, markets, demography and so on that others ignore. Then, they compare these patterns with the existing concept of "Occupational Opportunities". If this result was associated, may decide to start a new risk (Baron, 2004; Deakins and North, 2013).

Occurrence of numerous earthquakes in the region and geological survey regarding the current faults prove this fact that Iran is located on seismic zone. Considering the earthquakes occurred in recent years, most casualties and damage are to masonry buildings. Therefore, the necessity of retrofitting by using composite materials for these buildings becomes more significant (Alizadeh T. Abad et al., 2008).

The model used in this study is based upon Morrison model (James L.Morrison) which is based on four underlying stages:

1. Identifying the current situation and emerging trends in building industry using composite technology and related environmental aspects (Scanning).
2. Analyzing the meanings of economic trends of identified statuses and effective trends (Monitoring).
3. Prediction of the future market of building construction using composite technology (Forecasting).

4. Assessing the amount and timing of the development of demand and potential profitability (Assessing).

Research Methodology

Since this study attempts to identify entrepreneurial opportunities in the construction industry using composite technology, according to the new technology in composite, it is necessary to interview experts and professionals of this technology in the related industry and then provide a questionnaire that is approved by instructors of this technology. In this combined method, at quality stage, qualitative methods such as interviews were used, and at quantity stage, a questionnaire developed by the researcher and inferential statistics were used. The method of this research is descriptive - survey. This research is applied in terms of purpose and it is field in terms of data collection. Statistical population of this research consists of experts and professors in composite technology at University of Science and Technology, Institute and Association of Iranian materials, construction and building companies.

In this study, due to unavailability of a standard questionnaire, the researcher designed a researcher-made questionnaire. Obviously, the scientific basis for designing this tool requires an extensive study of the general and theoretical foundations of research and literature review of previous researches. After the pilot study on 20 people, experts, and engineers, the questionnaire was given to ten members of the university in order to determine its validity, the final questionnaire was set after their approval. In order to evaluate the validity of structure, data resulting from this scale were factor analysis in the sample group. This analysis was carried out through

factor analysis using principal component (PC). KMO coefficient was equal to 73/0, indicating the adequacy of the analyzed sample. Bartlett's test of sphericality also was significant at a high level (p <0/001).

For data analysis, descriptive statistics including the number and percentage of frequency by tables and charts was used, and statistics of single-sample t was used to compare the obtained average for the average hypothetical case study, Friedman test was used to rank components, and factor analysis was used to determine factors. All analyses were done using SPSS 17 software and at a significance level p≤0.05. In this study, Cronbach's alpha in a quantitative manner was used to determine the reliability of the test. Using statistical software SPSS, level of reliability coefficient of collected questionnaire with Cronbach's alpha coefficient was calculated greater than 70 percent. Cronbach's alpha was calculated for all of the questionnaire's questions, and 0.83 was obtained that represents that reliability of the questionnaire is approved at a maximum level.

Findings

All the 12 experts and professionals who were interviewed were male. Five had doctoral degree, four had master's degree, three had a bachelor's degree in engineering.

Table 1. Table of Education Data Research Sample

Percent	Frequency	Demographic	
41 %	5	PhD	
33%	4	Master Degree	Education
25 %	3	Bachelor Engineering	

Among the sample of 78 people, 70 individuals completed the questionnaire

that included 12 experts participating in the interview. Among them, 65 were male and the rest were female. The average education among these people is master degree. People from age 28 to 62 participated in answering the questions of questionnaire and interviews, and just as the sample indicates the number of experienced entrepreneurs is more than inexperienced entrepreneurs. In the participated sample at quantitative phase of the study, average years of establishment of corporation for experienced entrepreneurs was 6 and for inexperienced entrepreneurs was 3 years. 93% of the study were men and 7% were women. 25.7 % of the sample were bachelor's, 70% were master's, and 4.3% were PhDs. Meanwhile, 50% of sample age was between 25 to 30 years, 37.2% between 31 and 35 and 12.8% more than 35 years.

Table 2. Demographic Characteristics of the Sample Questionnaire

Percent	Frequency	Variable	Factors
% 93	65	Male	Gender
% 7	5	Female	
0	0	Diploma	Educational Degree
% 25.7	18	Bachelor	
% 70	49	Master Degree	
% 4.3	3	PhD	
% 50	35	Between 25-30	Age
% 37.5	26	Between 31-35	
% 12.8	9	Above 36	

In order to evaluate the validity of the structure, data resulting from conducting this scale in the sample were applied for factor analysis. This analysis was performed by factor analysis using principal component (PC). KMO coefficient was equal to 73/0, indicating the adequacy of the analyzed

sample. Bartlett's test of sphericity also was significant at a high level (p <0/001).

For data analysis, descriptive statistics including the number and percentage of frequency by tables and charts was used, and statistics of single-sample t was used to compare the obtained average for the average hypothetical case study, Friedman test was used to rank components, and factor analysis was used to determine factors. All analyses were done using SPSS 17 software and at a significance level p≤0.05.

The First Research Question

What is environmental situation in the various fields of the construction industry using composite technology like?

T-test is used to answer the first question of the research. As shown in the table below, the average of the main components are related to environmental trends is higher than the average temperature of the described spectrum (3). Considering the table below and in order to assess the significance of the difference between the main components with the average degrees of the described spectrum, One-sided T-test was carried out which resulted in Table 3 below:

Table 3. The Difference Between the Average Spectrum and the Average of the Main Components

P significance level	T amount	Average Difference	95 % Check Level	Standard Deviation	Average	Number of ppl	Component

0.00	2.32	2.32	2.11	2.53	0.88	2.32	70	Familiarity of Managers and Officials with Technology
0.00	3.85	3.85	3.69	4.01	0.67	3.85	70	Standards in Using Technology
0.000	4.05	4.05	3.95	4.16	0.44	4.05	70	Codified Rules
0.000	4.07	4.07	3.97	4.16	0.41	4.07	70	Resistant Buildings
0.000	4.19	4.19	4.06	4.32	0.54	4.19	70	Systematic and Orderly Planning
0.000	3.89	3.89	3.73	4.05	0.66	3.89	70	Construction of Buildings like Ancient Architecture
0.000	3.59	3.59	3.45	3.73	0.54	3.59	70	Restoring Historical Buildings with technology

The findings contained in the above table shows that the average opinion of experts and engineers in the components related to the environmental trends is higher than the average degrees of the described spectrum in the questionnaire (3). In order to clarify whether these differences can be regarded as an important component of the study, t-test was performed. The results show that from the views of experts and engineers (of the study), 7 components listed as components of environmental trends resulting from composite technology with 99% CL are higher than the average degrees of the descibed spectrum in the questionnaire.

The Second Research Question

What are the entrepreneurial opportunities in various fields of the construction industry using composite technology ?

To answer the second question of the survey, Friedman test was used to rank entrepreneurial opportunities in various fields. As shown in Table 5-4 from the perspective of sample research, entrepreneurial opportunities in the field of composites industry are as follows.

Table 4. Friedman test

sig	df	Chi-square	Average Ranking	Components
			11.24	Familiarity of Managers and Officials with Technology
			10.67	Standards in Using Technology
			10.24	Codified Rules and their Execution
			9.64	Systematic and Orderly Planning
			8.12	Production of Raw Materials for the Production of Composite Materials and Products
			7.86	Production of Natural Fiber Composites
			7.14	Retrofitting Buildings
0.00	15	286.24	6.39	Training Courses and Seminars and Educational CDs
			5.36	Construction of Religious Buildings of Islamic Architecture
			5.12	Preparation and Distribution of Books, Magazines, Journal and …..
			4.91	Start-up Businesses with the Technology in the Construction
			4.56	Use of Technology in Indoor Installations
			4.14	Use of Technology in Interior and Exterior Shots of Buildings
			3.75	Launch of Databases
			3.16	Restoration of Historical Monuments

	3.01	The Compulsory Course of Composite Technology for Students of Engineering and Management

The Third Research Question

Economically speaking, what's the economic meaning of environmental trends in different fields of building industry using composite technology?

To answer the third question of the survey among the observed components, Friedman test was used to rank components. Table 4 shows ranking and description of each component. As shown in table 5, results of Freidman test indicates that there is a significant difference between components, there are significant differences between the components in a way that component "Higher Confidence in Foreign Composite Products" has the highest rank and the component "Low Price of Some Foreign Composite Products" is second among components.

Table 5. Friedman test Results for Ranking Components

sig	df	Chi-square	Average Ranking	M±SD	Components
0.000	3	47.71	2.99	3.27±0.93	Higher Confidence in Foreign Composite Products
			2.84	0.7±3.3	Low Price of Some Foreign Goods
			2.46	3.14±0/83	Reasonable Price of Materials in Construction Projects
			1.71	2.56± 0.75	High Price of Materials in Building Houses

The Fourth Research Question

How will be the situation of various fields of the construction industry using composite technology in relation to specific trends in the future?

To answer the fourth question of the research regarding the future of composite technology in relation with specific trends, 10 major components were ranked by Friedman test through the views of experts, engineers and members of the faculty.

Table 6 shows that there is a significant difference between existing components in a way that highest ranks of the research respectively are: The first component ''Material Price Balance'' is the highest component with an average of 7.49. The second component ''Interaction between Industry and University'' with an average of 7.46. The third component '' Economic Growth and National Wealth Generation'' with an average of 7.26.

Table 6. Friedman test Results

sig	df	Chi-square	Average Rank-ing	Components
0.000	9	168.47	7.49	Matrerial Price Balance
			7.46	Interaction between Industry and University
			7.26	Economic Growth and National Wealth Generation
			5.95	Environment Protection
			5.84	Public Familiarity with this Technology
			4.59	Standardization and Gaining more Trust
			4.48	Creation of Values and Businesses
			4.30	Increase in GDP
			3.89	More Interaction with Industry
			3.74	Specialists Recruitment

The Fifth Research Question

In different areas of the building industry using composite technology, how and when does demand form? And how can it be a business?

Exploratory factor analysis with varimax rotation was used to answer the fifth research question (influential factors in increasing demand of using composite technology). Implementation of factor analysis in this study consisted of two phases: Extraction and Rotation factor. The main objective of the first stage is making a decision about the number of elements in a set of measured variables. The aim of the second phase is manipulation of statistical results (rotation factor) in order to make factors interpretable as well as making decisions about the main factors of the measured variables.

In the first stage of extraction of factors from correlation matrix is carried out by using one of the theoretical practices of principal component analysis. To interpret the factors that are relevant, the second phase will be assigned to rotation factors. The main basic and logical reason for the rotation of factors in the research is that it simplifies the structure of factors, and thus makes them easier to interpret. Given that the results of this study is interoperability and not particular, orthogonal rotation method was used. The main advantage of this method is that its results would be the best fit to the data of past and future. In fact, in this method, variables with larger factor loadings reduce to the minimum number. Table 7 shows the described factors.

Table 7. Average and Standard Deviation of each component

M±SD	Component
4.24± 0.64	Codification of Rules and Regulations
4.11± 0.57	Standardization
4.30± 0.68	Advertisement
3.37 ± 0.68	Book Publication
3.64± 0.7	Launching Information Center
4.32 ± 0.63	Quality Increase
4.35 ± 0.66	Cost Reduction
4.22 ± 0.48	Culturalization

According to Table 8, because the KMO statistic is equal to 0.73, the data are suitable for factor analysis. The results of Bartlett's sphericality test is also significant, which means the opposite hypothesis that there are significant correlations between variables is confirmed.

Table 8. KMO Statistics and Bartlett's sphericality of Results

KMO		0.73
Bartletts sphericality test	Approx chisqaare	383.03
	df	28
	sig	0.00

Table 9 indicates the quota of variables or total variance with the quota of shared variables. As can be seen in the table, the highest share is above 50%, which indicates the ability of identified factors in explaining variance factors in the study.

Table 9. Quota of Variables or Total Variance with Quota of Shared Variables

Extraction	initial	Component
0.9	1	Codification of Rules and Regulations
0.86	1	Standardization
0.92	1	Advertisement
0.54	1	Book Publication
0.66	1	Launching Information Center
0.86	1	Quality Increase
0.77	1	Cost Reduction
0.95	1	Culturalization

In general, it can be stated that "Culturalization" with factor loadings of 0.95, "Advertisement" with factor loadings of 0.92 and "Codification of Laws and Rules" with factor loadings of 0.90 are respectively influential factors in increasing demand of using composite technology.

Discussion and Conclusion

In recent years, with the development of entrepreneurial research, identifying opportunities has been of great interest to researchers as the focus of entrepreneurship. Emphasis on the opportunities and identifying them has gone so far that identifying opportunities has become known as heart of entrepreneurs. Holt (2004) argues that the importance of entrepreneurship in economic development and increasing resources has made it one of the four basic economic inputs, along with labor, land and capital. In different environments and different economic systems, this process is carried out by individuals who realize economic opportunities for creating value for people and society. According to Kirzner, entrepreneurship consists of identification of market opportunities and creation of a combination of resources for

their use. Considering various types of constructions and buildings including; conventional and traditional methods as well as advanced and industrial, use of composite technology in Iran, due to its annual use, is higher than other Asian countries. Use of this technology is important in every industry, especially the construction industry, for some reasons like: the need for housing with regard to population growth, earthquake resistant buildings, the construction of key state agencies using composite technology in times of crisis, maintaining religious and cultural structure of the country, employment in various sectors of industry and academia, and economic growth. Considering the carried out analysis, by executing and conducting some programs such as: "Codification of Laws and Regulations", "Standardization", "Culturalization", "Notification", Quality Increase ", " Costs Reduction ", Book Publication "," Advertisement "and etc…, the demand for the various businesses in this regard would be facilitated. Identified entrepreneurial opportunities in the industry using composite technology can each lead to the creation and the development of a large number of businesses, leading to job creation, human resources specialists, technicians, workers and eventually would contribute to economic growth and annual composite consumption growth compared with other countries. The main objective of the study is to identify entrepreneurial opportunities in the construction industry using composite technology, and finding what entrepreneurial opportunities can lead to start-up businesses, jobs creation and economic growth with a GDP approach and.... . In this study, after reviewing previous studies, primary and secondary research questions were answered by using a combined research method both in qualitative and quantitative sections. In qualitative section of the interview, open-ended and semi-

structured questions were used, and in quantitative section of the questionnaire consisted of three sections and one open-ended question which was confirmed by a number of experts in this technology.

Regarding the carried out analysis, by executing and conducting some programs such as: "Codification of Laws and Regulations", "Standardization", "Culturalization", "Notification", Quality Increase ", " Costs Reduction ", Book Publication "," Advertisement "and etc…, the demand for the various businesses in this regard would be facilitated.

The following items are with regard to the situation of composite technology in the future:

1. Economic growth and national wealth generation 2. Maintaining environmental 3. More familiarity with this technology 4. Standardization and gaining more confidence 5.Creation of value and launching businesses 6. Increasing GDP 7. More interaction with industry 8.Specialists recruitment 9. Familiarity of managers and officials with composite technology 10. Standards in use of technology, 11. Codified rules 12. Earthquake resistant building 13. Systematic and orderly planning 14. Construction of buildings in the style of ancient architecture 15. Restoration of historical monuments using this technology. All of the above items as components of the environmental trends resulting from composite technology with 99% CL can help us reach our goal quickly.

Identified entrepreneurial opportunities in the industry using composite technology can each lead to the creation and the development of a large number of businesses, leading to job creation, human resources specialists, technicians, workers and eventually would contribute to economic growth and annual composite consumption growth compared with other countries.

Recommendations for Future Researches

According to entrepreneurial opportunities identified in this study, each can be a sole subject for further research and study. In addition to them, the following are recommended for future researches:

1. Identification of business development solutions using composite technology in construction industry,

2. Identification and analysis of entrepreneurial opportunities in the defense industry using composite technology,

3. Identification of business opportunities using composite technology in the industry,

4. Identification of future markets in developing businesses using composite technology in the industry,

5. Identification and analysis of entrepreneurial opportunities in the maritime industry using composite technology.

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