

The Relationship between The Use of Information Technology and The Development of Agricultural Manufacturing

Field study in Algharbya, El-Behira and Alexandria governorates

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ABSTRACT

The industrial activities play a pivotal role in our social life. Through what it's accumulate to both; the value of work from the human being side, and to the value of ideal utilization from the side of elements of industrial process. Therefore; the socioeconomic development is the final form of interaction between those values. Accordingly; the information technology (IT) is being widely employed in all fields of agricultural industry, a growing body of informatics and mediated communication has been expanded in recent agricultural activities; whereas information technology increasingly provides realistic opportunities and strategic tools to the industrial organizations enabling them to manage their resources more efficiently. The aim of this study is to examine the relationship between the use of information technology and the development of agricultural manufacturing. The study was carried out in Algharbya, El-Behira and Alexandria governorates, with a total sample of 94 companies (representing 5 main industrial activities: agricultural machinery, fertilizers, pesticides, animal fodder and seeds treatment) selected randomly from the records of ministry of industry. The data was collected by personal interviews from the top managers. Data was statistically analyzed by using stepwise multiple regression. Results demonstrate that the technical analysis is explaining about 20% from the variance of agricultural manufacturing development and market analysis explains about 11% from the variance of dependent variable, and finally the industrial planning explains about 4% from the variance of the development agricultural manufacturing. The results were conceptualized around applied linkage that connects three practical fields: the strategic planning of agricultural manufacturing, information technology and managerial systems. Accordingly; the development of agricultural manufacturing deliberated through: 1- restructuring the relation between the information flows and industrial objectives. 2- Inter organizational cooperation .3- flexible responses to industrial changes.4- the periodical evaluation to external settings.5- realizing the equation of opportunities and threats. 6- the association between industrial priorities and social awareness, self interest and diversity.

INTRODUCTION

An evolutionary step is occurring in the human societies, in the last decades. This progression affects every aspect of human existence: personal, social, spiritual, material and scientific. This step includes three main basics: social awareness, self interest and diversity. The major factor in human development that will affect industrial economy is: the recognition of social awareness. It causes people to join together in groups of common interest. It also entails individual responsibility to the group; each person is expected to achieve his task; standards of social behavior are enforced through a process of interaction within groups (Murray, 1993).

Responsibility has added a new factor to social awareness; sustainability, whereas natural resources and power sources can no longer be used, wasted or damaged indiscriminately because it is known that this has definite harmful effects on the life support system as a whole. We have learned that everything is connected. This new awareness is part of the evolutionary process, when we apply what we know in practical structures and methods.

The second basic is the self interest, and its part of industry. It motivates people to get jobs, investor to finance their activities, start up a business, and seek a promotion or higher wages. At the same time, many people do take actions based on altruistic or motives, such as charity work, religion, environmental work, or various forms of education and mutual aid. Self interest is not the only factor in industry, but it is one of the primary factors.

Self interest is best served by satisfying the needs of all people as one unit, but in the time the facts could be ignored, there were always rules to be ignored. Lately, a few industrial activities polluted a neighborhood or paid low wages, in order to maximize personal profits at the expense of the many. When community health care taxes got too high, and it became harder to find healthy workers, the owners could go somewhere else. Of course, not every individual will automatically recognize the obvious. But the general trend of social awareness will create pressures towards social responsibility, development is not automatic, but its pressures are relentless.

Another effect of social awareness is the tendency to identify with a group. People join those with whom they have affinity and common

interest. Among these affinity groupings are the Industrial activities and workplaces. Recently, ownership and control of industry, the means of production, will be more and more a controlled group activity and less concentrated in the hands of individual perception.

The third basic is the diversity, every industry will consist of a number of different processes, from the primitive to the most technologically advanced. This work, occurring in many locations, is joined by the Industrial organization of the workers, instead of the governmental authority, private sector and civil society.

Production in the recent Industries may be done by different methods, using dissimilar technologies, among the Industrial investors. This will lead to a variety of different mode of production being available in different places. The federated Industrial activity, regional, national, or global, will devise methods of relating to each other, as practical, for example, developing standards across the industry for quality control (Murray, 1993).

Interconnections between diverse elements lead to solutions. Science and industry will be applied to the solution of problems, through inter-connecting the knowledge of various fields. Industrial activity consists of scientific knowledge applied through technology, science, economic and power generating, from one side; and human experience, self motivation, investment, finance and management from the other side. In a similar merging process, knowledge, skills, technology, and capital will be inter-connected to solve basic problems such as unemployment, poverty, and illiteracy. The Industrial activities through Unions of workers will conspire with their communities to bring about these solutions (Johnson& Scholes, 2002).

In economic terms, the essential problem of human social development has always been to produce and distribute products for survival and material advancement. The industrial activity is transferring the biological form (human being) to the social form (worker). And it's upgrading the institutional capacity that advances the human exchange into organized labor force (Ward, 2003).

The development of industrial activities has increased the rapidity in which information and knowledge is disseminated and exchanged, which in turn, has reduced the life of information. As the information content of

commodities increases the necessity for the rapid exchange of information increases, which in turn leads to the development of more rapid means of communication, which in turn enables the further increase in the information content of commodities (and services). The increase in the information content of commodities forms an identity with the increase of the role of information in the production process (Nonaka & Takeuchi 1995).

Consequently; agricultural industries differ tremendously with the respect to technology the means by which they transform inputs into outputs, these can vary from the simplest of tools used by single individual to huge machines and complex, automated equipment. Clearly, the technology employed by a given organization is closely linked to the work it performs and the major tasks it seeks to accomplish. But growing evidence indicates that this relationship, too, is some thing of two way street. Organizations not only choose the technology they will utilize; they are also affected by such tools once they are selected.

Information technology (IT) has been employed in many agricultural fields, including production forums, industrial activities, and manufacturing processes, marketing research, visibility studies, consulting services, digital programming, organizational communication, technical support communication and the databases of exporting facts and conditions.

In short, just as the design of specific buildings reflect the activities that take place within it, the structure of many organizations, as well, tends to mirror the technologies they apply. In Egypt; agricultural industry, over the years, the use of information technology is gradually developed and the range of custom is ultimately expanded. Salah (2005) is reviewing in his study the main barriers of information technology expansion in agricultural industry:

- High cost of the applications of information technology.
- Non existence of infrastructure such as the mediated access.
- Lack of expertise in terms of programming, processing and maintenance.
- The inadequacy of governmental information centers.
- The connectivity with the agricultural administrative is not reliable.
- The informatics with industrial authorities is basically; insufficient.
- Lack of electronic marketing services and assessments.

- The unavailability of consultancy providing and sourcing.
- The formal industrial services is mainly, centralized.
- Lack of scientific support and technical logistics.
- The services of exporting are essentially; partial, inadequate and limited.
- The absence of industrial forecasting: modules, data and programs (Salah, 2005).

Finally; Information technology (IT) has a critical role for the sustainable growth of agricultural industries by enhancing the ability to manage their resources, increase their productivity, to market their offerings and to develop partnerships with all their stakeholders. Another attribution of the (IT) in the business world, which is the operational expansion of their activities regionally, nationally and globally.

THEORETICAL BACKGROUND

The theoretical contributions of information technology are primarily based on three theories: Social Presence Theory, Information Richness Theory, and Social Context Cues Theory. According to these three theories face to face communication has the most social cues and information (including verbal and nonverbal cues) to convey emotions, thoughts and ideas in communication, while IT communication has the least social cues and information (limited to only verbal cues). Therefore, IT tends to be inherently task-oriented and to lack emotional content in human communication.

Social Presence Theory: According to Social Presence Theory, social attendance refers to the extent to which a medium is perceived as conveying the actual physical presence of the communicators. Thus, social presence not only depends on the communication of words, but also on a variety of nonverbal cues such as physical distances, postures, facial expressions, and the like. According to this theory, different types of media vary in their "capacity to transmit information about facial expression, direction of looking, posture, dress and nonverbal, vocal cues". Therefore, from the perspective of Social Presence Theory, (IT) treatments lack nonverbal cues and is destined to lack emotions and high productivity (Smith, 1993).

Information Richness Theory: Information Richness Theory refers to the extent to which a medium or information is perceived as rich or lean by the communicators. The communication effect is influenced by the richness of the media or information among the communicators. According to this theory, information is a key construct for understanding organizational process and structure. Organizations must use information to reduce uncertainty in vertical information transfer and for coordinating internal activities. Communication medium differ in the richness of information processed. According to this theory, (IT) treatments have the least rich productive and efficient information, while face to face treatments were formulating the communication prerequisites and basics (Stallabross, 1995).

Social Context Cues Theory: Social Context Cues Theory is primarily based on the fundamentals of symbolic interactionism theory. Social Context Cues Theory refers to the extent to which a medium is perceived as providing social context cues and symbols to the communicators. The theory concerned that (IT) has: (a) a paucity of social context information, and (b) few widely shared norms governing its use. In addition, according to theorists, the status hierarchy of a communication exchange can regulate group behavior if group members perceive the social order. People perceive the social order through both static and dynamic social context cues. Static cues come from people's appearance. Dynamic cues come from people's behavior, such as frowning with unhappiness and nodding approval. According to this theory, (IT) treatments have the least social context cues, while face to face treatments have the most social context cues in symbolic communication (Kumar, 1995).

Since these three theories have similarities, they are all referred to as the evolution of the symbolic culture. From this perspective, nonverbal cues not only regulate social interaction and exchanges, but also supply valuable information about the communicators. This kind of information is very helpful in forming impressions, assessing the ways the participants understand and reply to messages, and determining the truthfulness of the participants' communication. Accordingly, the filtered-out cues affect the communicators in three ways: regulation of social interaction, perception and impression formation, and awareness of the social context of communication. Based on this perspective, all (IT) environments could be viewed as more accurate, valid and reliable handlings (task oriented) than

face to face handlings (personal oriented) because of the constraints of perceived cues in the symbolic interaction.

AIM OF THE STUDY

The main objective of this study is to examine the relationship between the use of information technology (market analysis, technical analysis, financial analysis and industrial planning) and the development of agricultural manufacturing.

METHODOLOGICAL PROCEDURES

Sampling Design: The study was performed to explore the role of information technology on the development of agricultural industries. The study focuses into the small industrial activities that affect the agricultural process directly, accordingly; the sampling frame of this study is designed under three criteria:

- 1- The issued capital of the company should be less than 5 million Egyptian pounds.
- 2- The selected company should be specialized in the agricultural production.
- 3- Food production, dairy production, mills were excluded from the population.

By this logic the sampling frame of study includes 5 main agricultural activities; machinery, fertilizers, pesticides, animal fodder and seeds treatment as showed in table (1). The sampling frame consists of 468 companies distributed as follows: 81 at Alexandria, 182 at El-Behira and 205 at Algharbya governorate (Ministry of industry.2006).

Table (1) the sampling frame

Site/industry	Machinery		fertilizers		pesticides		animal fodder		seeds treatment	
	P	S	P	S	P	S	P	S	P	S
Alexandria	9	2	23	5	12	2	20	4	17	3
Al-Behira	34	7	42	8	29	6	36	7	41	8
Algharbya	47	10	33	7	34	7	35	7	56	11
Total	90	19	98	20	75	15	91	18	114	22

The random systematic sample was applied to select 20% from the records of ministry of industry studied sampling frame (Ministry of industry.2006). Hence; the sample of study consists of 94 of top management employees or owners of the selected agricultural industries as showed in table (1).

The operational definition of information technology:

The study has tried to give a more collective definition by considering information technology as the entire range of electronic tools that facilitate the operational and strategic management of organizations by enabling them to manage their information, function and processes as well as communicate interactively with their stakeholders, enabling them to achieve their objectives. The range of these electronic tools represents a convergence of new hardware, software, telecommunications, internet, wireless connectivity and mediated networks.

Measurements: The study exploited the development of agricultural manufacturing as dependent variable and use of information technology is representing 4 independent variables: market analysis, technical analysis, financial analysis and industrial planning, as follows:

First: the dependent variable: The development of agricultural manufacturing was measured by using of the Southampton business school and adapted version of the industrial development index that includes 18 items (Ranshod, 2003):

- 1- The overall productivity.
- 2- The Employee productivity = (total productivity/no of employees).
- 3- The Profit margin.
- 4- Sales growth.

- 5- The actual attained goals/total goals.
- 6- Customer's satisfaction.
- 7- The reliability of local technology.
- 8- The overall performance.
- 9- The quality of after sale services: 3 sub items: Technical support,
- 10- Maintenance and
- 11- Compensation arrangements.
- 12- The expansion of local products.
- 13- The rate of technological independency (regarding the on foreign dependency).
- 14- The interconnectivity between local producers and the foreign sources: 4 items regarding: finance,
- 15- investment,
- 16- management , and
- 17- Manufacturing.
- 18- The fitness of local exporters.

The variable of development of agricultural manufacturing was measured by : the evaluation of progress at last three years, and 6 answers were designed as follows ; (no progress) , (the progress was less than 10%) , (from 10% to 20 %), (from 20% to 30%) , (from 40% to 50 %) ,(more than 50%) , weighed from 1 to 6 respectively (Ranshod, 2003).

Second: the independent variables: the independent variables include market analysis, technical analysis, financial analysis and industrial planning, the measurements of all independent variables was appraised by the model of information technology developed by Pantasiz (2004).

1- Market analysis: includes 7 items:

- 1- Communication between company and external environment is lateral and multi-dimensional.
- 2- Listening to the opinion of customers.
- 3- Use customer information to improve quality.
- 4- Company objectives are formed based on-Customer needs.
- 5- Use market research data in managing products/services.
- 6- Use research to segment markets.
- 7- Using the customer opinions to determine the market needs.

2- Technical analysis: contains 7 items:

- 1- Use customer information to develop the new technologies.
- 2- Using IT for analyze the competitive technologies
- 3- Using IT for importing the new technologies.
- 4- Using IT for manufacture the specific products.

- 5- Using IT for quality control.
- 6- Using IT for administrative activities.
- 7- Using IT for the logistic and seasonality analysis.

3- Financial analysis: consists of 6 items:

- 1- Investing in building communication databases.
- 2- The assessment of market position regarding the financial performance.
- 3- Prices are determined by customer value.
- 4- Focusing on markets in which we have competitive strength.
- 5- The sales force has information on customers and competitive.
- 6- The financial resources were evaluated based on information technology.

4- Industrial planning: includes 9 items

- 1- Developing specific plans for different market segments.
- 2- Providing adequate resources to products in order to improve communication position.
- 3- Obtaining ideas from customers to improve quality.
- 4- Marketing tactic relies on market communication.
- 5- IT system to accommodate organizational change.
- 6- Management decisions are enforced through IT information and knowledge.
- 7- The guidelines of work are determined by IT background.
- 8- IT information is, basically, performed on innovative strategies.
- 9- Using the IT information to design the short termed plans (Pantasiz, 2004).

The all items of independent variables (market analysis, technical analysis, financial analysis and industrial planning) were measured by formulated answers; strongly agree, agree, neutral, disagree and strongly disagree ,weighed from 5 to 1 respectively (Pantasiz, 2004).

Data collecting: The secondary data was collected form the administrative records of ministry of industry. And the questionnaires were pre-tested and collected by personal interviews from May to August 2007.

RESULTS

Multiple regression analysis proved that the independent variables collectively are correlated with the development of agricultural manufacturing with a multiple correlation coefficient of 0.608. Whereas F value was 4.975 and it's significant at 0.006, this means that those significant variables explain about 37% of the variance in the development of agricultural manufacturing as dependent variable.

Stepwise regression model yielded a reduced equation containing 3 variables and explains 35% from the variance of the development of agricultural manufacturing (as dependent variable) and the financial analysis was excluded from the equation. Table (2) clarified that: multiple correlation coefficient was 0.593 and F value 6.28 and it's significant at 0.002, R^2 value was 0.352 which means that independent variables explain 35% from the variance development of agricultural manufacturing (as dependent variable).

Table (2) the stepwise multiple regression analysis

The independent variable	Beta	t value	Sig.	R^2	
				change	Accum.
Technical analysis	0.572	4.601	0.009	0.203	0.203
Market analysis	0.416	3.342	0.016	0.112	0.315
Industrial planning	0.171	2.066	0.034	0.037	0.352
Multiple R = 0.593				F= 6.28**	

The independent variables were ranked as follows: the variable of technical analysis explains 20% of the variance in the development of agricultural manufacturing, and market analysis variable explains about 11% % of the variance dependent variable, and finally; the industrial planning explains about 4% of the development of agricultural manufacturing as dependent variable.

CONCLUSION

Results of this study provided an overview of the relationship between the use of information technology and the development of agricultural manufacturing. Essentially; it argued that industrial planning, technical analysis and market analysis should be reflected in the development of agricultural manufacturing. More specifically; results were conceptualized around applied linkage that connects three practical extents: the strategic planning of agricultural manufacturing, information technology and managerial system. The last extent is critical both from an industrial point of view. Thus, information technology was traditionally out looked as belonging to the managerial system functions, as well as an organizational point of view to discuss changing roles and responsibilities.

The extents of the strategic planning of agricultural manufacturing, information technology and managerial system achieve its objectives through:

- 1- Reconfiguration of the information flows with industrial objectives to provide comparative advantages relative to competition.
- 2- Expansion of inter organizational systems that extend beyond the traditional boundaries of single organization.
- 3- Flexibility of industrial design to facilitate modifications in information requirements to respond to the fast changing technical cores.
- 4- The assessment of external environment to ensure the industry/society alignment.
- 5- The strategic choices and responses to exploit information technology should be structured based on opportunities and threats principle.
- 6- Industrial priorities are associated with social awareness, self interest and diversity

Analytically; the linkage between three extents is proposed through four determinants:

- 1- Originate the industrial decisions, alternatives and processes based on information technologies
- 2- Provide operating data that can be used for strategic decisions, forecasting and adjustments.
- 3- Offer fully integrated system that allows agricultural manufactures to be efficient low cost producers.
- 4- Allocate human and physical resources; collectively and interactively to achieve the industrial outcomes.

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الملخص العربي

العلاقة بين استخدام تكنولوجيا المعلومات وتطوير التصنيع الزراعي

دراسة ميدانية بمحافظات الغربية والبحيرة والأسكندرية

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تلعب الأنشطة الصناعية دوراً محورياً في حياتنا الاجتماعية، من خلال ما تضيفه لكل من قيمة العمل لدى الإنسان، وقيمة إستغلال المورد لدى عناصر العملية الصناعية، كما ان التنمية الاجتماعية الاقتصادية هي الشكل النهائي للتفاعل بين هاتين القيمتين. ولقد بدأ التوسع في استخدام تكنولوجيا المعلومات وتطبيقاتها الاتصالية والمعرفية في كافة الأنشطة الزراعية الحديثه، باعتبار ان تكنولوجيا المعلومات تمد المنظمات الصناعية الزراعيه بكل من الفرص الواقعيه والادوات الاستراتيجيه، والتي قد تمكنها من اداره مواردها بشكل اكثر كفاءة. وتهدف هذه الدراسة إلى اختبار العلاقة بين استخدام تكنولوجيا المعلومات وتطوير التصنيع الزراعي. ولقد اجريت الدراسة بمحافظات الغربية والبحيرة والاسكندرية، من خلال عينه تضمنت 94 مصنعا (يمثلون 5 أنشطة صناعيه اساسيه هي الميكنه الزراعيه، والاسمده، والمبيدات، والعلف الحيواني، ومعالجه التقاوى) حيث تم اختيارها بطريقه عشوائيه منتظمه من واقع سجلات وزارة الصناعه. وتم جمع البيانات عن طريق المقابله الشخصيه مع مديري المصانع التي تمثل عينه الدراسه. وقد تم تحليل البيانات احصائيا اعتمادا على الانحدار الخطى المتعدد المتسلسل. وقد اوضحت نتائج الدراسه أن متغير التحليل الفنى يفسر بمفرده حوالى 20% من التباين فى متغير تطوير التصنيع الزراعي، كما أن متغير تحليل السوق يفسر بمفرده حوالى 11% من التباين فى المتغير التابع، ويفسر متغير التخطيط الصناعى 4% من التباين فى متغير تطوير التصنيع الزراعي. وقد تم وضع نتائج الدراسه فى إطار عمل يربط بين ثلاثه ميادين: التخطيط الاستراتيجى للتصنيع الزراعي، وتكنولوجيا المعلومات، والنظم الاداريه، واستادا لما سبق، تم إقتراح مجموعه من آليات العمل المحققه لتطوير التصنيع الزراعي، والتي تتضمن كل من: 1- إعاده صياغه العلاقه بين تدفق تكنولوجيا المعلومات وكيفيه وضع الاهداف الصناعيه. 2- التعاون ودعم العلاقات التنظيميه على المستوى المحلى. 3- أن تتسم ردود الافعال للتغيرات الصناعيه بالمرونه. 4- التقييم الدورى لأوضاع بينه العمل المحيطة. 5- أن يتم تطوير التصنيع الزراعي فى ظل معادله الفرص التحديات. 6- أن يتم ربط الأولويات الصناعيه بكل من الوعي الاجتماعى، والمصلحه الفرديه، والتنوع الصناعى.