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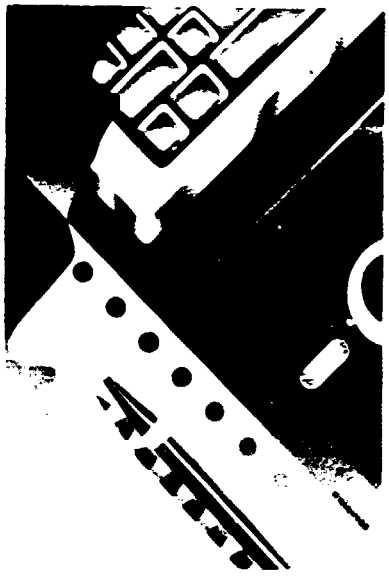
MARKET STUDY ON THE FOOD INDUSTRY FINAL REPORT



MARKET STUDY ON THE FOOD INDUSTRY FINAL REPORT

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PART ONE : INTRODUCTION

Environmental Quality International (EQI) has been contracted by the United Nations Industrial Development Organization (UNIDO) to conduct an industrial market survey, in association with the Netherlands Institute for Applied Scientific Research (TNO), to serve as a basis for the extension of the services of the Food Development Center (FDC), in Kaha, Qaliubeya governorate.

I. BACKGROUND

The Food Development Center (FDC) was established by the Government of Egypt. Its further development is promoted in the framework of an international development project in which the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO), and the Government of the Netherlands, through the Netherlands Institiute for Applied Scientific Research (TNO), cooperate. Organizationally, the FDC is a part of the public sector authority for food industries. It mainly serves state-owned enterprises overseen by the authority, but also extends its services to the private and investment sector. The FDC's objective is to promote the development of the Egyptian Food Industry by improving both the quality of food products and packaging and the efficiency of production processes. The FDC provides a variety of analytical, training, and research services through its laboratories, pilot plant for research and development, and training facilities. Services currently provided include chemical, physical, and microbiological analysis for testing raw and intermediate materials, final products, and packaging materials. A pilot plant for research and development in the areas of vegetable and fruit processing, oil and fat processing and bakery products is currently being installed. The FDC is planning an expansion of its services to include a wider range of analytical services. A varitey of training services to be provided at the centre, at the factory, and/or abroad are planned for the FDC's future activities, in addition to consultancy missions by foreign experts. Appendix 1 provides a full description of the FDC.

II. OBJECTIVES

The objective of this study is to assist the FDC in developing its range of services in response to the food industry sector in Egypt. This study identifies the following:

- the analytical, research, training, and information services in demand by the food processing sector in Egypt;
- awareness in the food industry of services provided by the FDC; and
- perceived advantages and limitations by the food industry to the operation of the FDC.

Guidelines for the development of FDC services, in response to both public and private sector demand, have been developed; and appropriate measures for the enhancement of the FDC's image within the industry are proposed.

III. METHODOLOGY

The study is primarily based on data collected through a lengthy questionnaire targeted to the food industry (Appendix 2). For the sake of consistency with the FDC scope of services, the survey unit was chosen to be the production unit (the factory), rather than the business unit (the company). Therefore, all questions were targeted for the factory level. The questions were designed to collect information about factory characteristics, problems encountered by the factory, actual supply of analytical training, research, and information services at the factory, factory demand for these services, and the respondents' perception of the FDC.

A pilot test of ten questionnaires was implemented, to ascertain the applicability and suitability of questions. The questionnaire wide scope has implied that respondents should be high level managers[1] , preferably general managers, production or technical managers. In a few instances, more than one respondent from the same factory have cooperated in answering questions related to their speciality. The questionnaire was mainly composed of binary and multiple choice questions but, a number of open-ended questions were included. These questions reinforced the interviewers' efforts to involve a respondent in short dialogues on issues related to the factory's circumstances. The views articulated during these dialogues not only enriched the data on which the study was based, they also helped both interviewer and interviewee get through the dry question/answer sequences in the questionnaire.

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[1] Our experience proved that other departmental managers do not have the necessary factory overview.

The questionnaire was administered on factory premises, in order to complement the formally collected data with the interviewer's own observations of the factory.

The target population was food processing factories in Lower Egypt including Greater Cairo. Firms located south of Cairo (Upper Egypt) were excluded. The tobacco industry, although typically considered a part of the food industry, was also excluded. The sample was stratified in two dimensions to ensure a close representation of the target population. The public/private ownership ratio was fixed at 1:2, and in terms of location Cairo/Alexandria/Eastern Delta/Western Delta was kept at 3:1:1:1. Moreover, the sample was designed to include factories working in fruit and vegetable processing, drinks bottling, oil and fat processing, and bakery products, among others. The sample was also purposefully biased towards larger factories since these factories are the most likely users of the services offered by the FDC.

Within these limits, the sample was at first randomly chosen from lists compiled from a number of sources and directories (Appendix 3). Unfortunately, those lists, based mainly on the commercial register, were found to contain inaccurate information. A high percentage of the firms chosen through these lists could not be located or contacted. Accordingly, an alternative sampling strategy had to be devised.

Each interviewer was asked to recommend a number of factories for the next interview. This strategy was efficient in terms of time and effort, but had one drawback: the sample did not represent the food industry in Egypt accurately enough. As will be seen the sample has a high percentage of factories having agreements with foreign parties, as well as a high percentage of exporting factories. However, being aware of this sampling drawback makes its effect on the study controllable.

A total of 175 factories were targeted, of which 30 could not be located or were out of business. Out of the 145 factories identified and approached, only 130 agreed to cooperate. Ten of these were not included in our final analysis (8%) due to reasons such as bias, poor answer quality, or exceptional circumstances faced by factories (2 factories have just started operation and another 2 were closing). Therefore, 92% of the questionnaires were of the standard required for analysis. In other words, 83% (120 factories) of the factories approached were included in the final analysis

PART TWO : FINDINGS

I. Sample Profile

The survey sample consisted of 120 factories, both publicly and privately owned, representing various product categories within the food industry. Factories are distributed between Greater Cairo, Alexandria, the Western Delta, and the Eastern Delta regions. Several variables were addressed in building the sample profile. These were: factory ownership, product category, location, date of establishment, size, existence of foreign agreements, production technology, export status, and change in production volume.

A. Factory Ownership:

About one third of the factories included in the sample are publicly owned (39 factories). The remainder are privately owned factories (81 factories). This includes private factories in which public companies have a share of the investments, but on which investment laws are applied.

B. Product Category:

The sample was divided into groups representing similar products according to the principal product of the factory sampled. Product categories represented independently in the study are:

- Bakery products, mainly biscuits and cakes.
- Bottled drinks,including water, soft drinks, and beer.
- Dairy products, which include cheese, milk, yoghurt, and ice cream.
- Processed fruits and vegetables (canned or frozen), as well as fruit juices, jams, marmalade, and pickles.
- Meat products.
- Processed oils and fats, which include edible oils and fats, soaps, detergents, sesame oil and paste, as well as glycerine.
- Sweets, which consist of confections, chocolate, candy bars, and syrup.

Other product categories will be included in the aggregate analysis, but will not be considered independently. These "others" are fish products, animal

feed, natural herbs, soup cubes, snacks, pastas, sugar, dehydrated vegetables and fruits, starch and yeast, additives and artificial flavors, as well as high fructose syrup. None of these products were found to be the major product of more than three factories in our sample.

C. Location:

It should be borne in mind throughout the analysis that none of the meat processing factories that are included in the sample are publicly owned. Moreover, the ratio of public bottling factories and those processing oils and fats is higher than the average sample ratio. The geographic distribution of the factories results from the sample stratification. Factories located in Greater Cairo (including those in the 10th of Ramadan Industrial City) represent approximately one half of the sample. The remainder is more or less evenly divided between, Alexandria, Eastern Delta (the Governorates of Damietta, Port Said, Ismailia, Suez, Sharkia, and Dakahlia) and Western Delta (the Governorates of Menoufia, Gharbia, Beheira, Kafr El Sheikh, and parts of Kalioubia that are not incorporated in Greater Cairo). Table 1 shows the sample distribution by product category, location, and ownership.

Table 1: Sample Distribution by factory location, factory ownership, and product category

Product Category	Location												Total		
	Greater Cairo			Alexandria			Eastern Delta			Western Delta					
	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total	Public	Private	Total
Bakery Products	1	9	10	2	1	3	--	1	1	--	1	1	3	12	15
Bottling	3	4	7	1	2	3	3	--	3	1	1	2	8	7	15
Dairy Products	1	4	5	2	--	2	2	3	5	--	2	2	5	9	14
Fruits & Veg. Process	1	4	5	3	1	4	1	1	2	1	2	3	6	8	14
Meat Process.	--	7	7	--	1	1	--	--	--	--	--	--	--	8	8
Oils & Fats Process.	1	4	5	3	1	4	2	1	3	4	1	5	10	7	17
Sweets	--	9	9	2	2	4	--	4	4	--	4	4	2	19	21
Others	2	7	9	1	--	1	2	3	5	--	1	1	5	11	16
Total	**9**	**46**	**57**	**14**	**8**	**22**	**10**	**13**	**23**	**6**	**12**	**18**	**39**	**81**	**120**

D. Date of Establishment:

The factories included in the sample represent five different eras witnessed by the Egyptian economy. After the liberal era that ended with the 1952 Revolution, only smaller private investments were infused in the Egyptian industry. This trend was accentuated by the overall nationalization of 1961 and the repercussions of the war of 1967. From this date up to 1974, when Sadat's open door policy began, most investments were public. Finally,1982 marks the end of the economic boom that followed the open door policy of the 1970's (for details refer to Table 2).

Table 2: Sample Distribution, according to date of establishment

Date of Establishment	N
Before 1952	26
1953 - 1961	23
1962 - 1974	13
1975 - 1982	25
1983 - 1990	30
Total	117*

* 3 respondents did not know when their factory was established.

E. Factory Size:

Throughout the analysis, the sample will be divided into four categories of factory size, based on the number of permanent employees. The majority of the large factories are publicly owned. However, a negiligble percentage of publicly owned factories have less than 100 permanent employees (5%).

Table 3 shows that the distribution of private factories is more symmetrical, private factories are mainly small and medium sized. Therefore, meat processing and sweet producing factories already seen to be almost privately owned in our sample, tend to be smaller than the total sample distribution. On the other hand, oil and fat processing factories which are mainly publicly owned, have a skewed distribution towards larger factory size.

Table 3: Sample Distribution, according to factory ownership and size

Ownership	Factory Size								Total	
	Micro [0,10[		Small [10, 100[		Medium [100, 1000[		Large ≥1000			
	N	%	N	%	N	%	N	%	N	%
Public	1	4	1	3	22	56	15	39	39	100
Private	4	5	38	48	35	44	2	3	79*	100
Total	5	4	39	33	57	48	17	15	118	

* 2 respondents from private factories did not disclose the number of permanent employees of their factories.

F. Foreign Agreements:

The percentage of factories having agreements with foreign parties is 23%. This percentage is purposefully higher[2] than that of the total food industry in Egypt. The inclusion of a significant number of factories having foreign agreements in our sample allows a more meaningful investigation of the trends associated with those foreign agreements. However, it should be borne in mind throughout the analysis that aggregate trends will be affected by the sample design. Table 4 shows the distribution of different types of foreign agreements according to factory ownership.

Table 4: Distribution of Foreign Agreements, by factory ownership

Ownership	Foreign Agreement										Total	
	None		Joint Venture		License Agreement		Subcontractors		Others*			
	N	%	N	%	N	%	N	%	N	%	N	%
Public	31	80	--	--	6	15	1	3	1	3	39	32
Private	61	75	6	7	7	9	2	3	5	6	81	68
Total	92	77	6	5	13	11	3	3	6	5	120	100

* include transfer of know - how, technical assistance, and management agreements.

[2] A reliable survey of the food industry does not exist. However, due to both the historical indigeneous development of the industry in Egypt and the nationalisation period from the fifties to the midseventies, the percentage of factories having agreements with foreign parties could be safely assumed to be less than half the sample percentage.

It should be noted that most of the agreements with foreign parties in which public factories are involved are license agreements. Further analysis reveals that more than 60% of license agreements are with bottling companies. Furthermore, ten out of the fifteen bottling factories in our sample have foreign agreements (8 of which are license agreements). On the other hand, not one of the meat processing factories in our sample has a foreign agreement. Only one of the twenty one sweets producing factories, has an agreement with a foreign party (a joint venture). In other words, while on the aggregate bottling factories will be the most influenced by their agreements with foreign parties, meat processing factories, and those producing sweets will not be affected by foreign agreements.

G. Production Technology:

The respondents were asked to situate their factory's production technology relative to that of other Egyptian factories producing similar products. Table 5 classifies these answers into 4 categories: Traditional, Average, Modern, and Heterogeneous[3]. While privately owned factories are more likely to use modern technology than publicly owned ones, there is also a higher percentage of traditional factories in the private sector[4]. The bulk of the sample consists of factories using average or modern production technology. Nevertheless, the number of factories using traditional or heterogenous production technology allows for meaningful comparisons.

Table 5: Distribution of Production Technology, according to factory ownership

Ownership	Production Technology								Total
	Traditional		Average		Modern		Heterogeneous		
	N	%	N	%	N	%	N	%	
Public	3	8	15	39	8	20	13	33	39
Private	10	12	28	35	36	44	7	9	81
Total	13	11	43	36	44	37	20	17	120

Not surprisingly, those factories in our sample having agreements with foreign parties use more advanced technology than factories without such

[3] See appendix 4 for definitions of these terms.

[4] These are smaller factories involved in processing meat, or producing sweets, dairy products, soap, sesame oil and paste.

agreements. Furthermore, joint venture factories are more likely to use modern production technology.

The gap between factories using different production technologies seems to be widening. While only 46% of factories using traditional technology are planning for improvements within the next two years, 56% of the factories using average technology plan to do so, as compared to 64% of the factories using modern technology. Our sample indicates that the more advanced the production technology, the higher the rate of improvement will be. Nevertheless, factories using heterogenous production technology are most likely to change their technology. These factories seem to be in a state of disequilibrium, as a result of the heterogenous technology they use. Consequently, 80% of these factories plan for changes or improvements within the next two years.

H. Exports:

More than 50% of the factories in our sample export. Obviously, this does not reflect the actual percentage of exporting factories in the food industry[5]. It should, therefore, be taken into account throughout the analysis that aggregate results are not to be projected on the total food industry population without consideration of this bias towards exporting factories.

Table 6: Contribution of Exports to Total Factory Revenue.

Contribution of Exports	Factories	
	N	%
None	57	49
Unspecified	4	3
Less than 10%	16	14
From 10% to 50%	30	26
Over 50%	10	9
Total Exporting	60	51
Total	117*	100

* 3 respondents did not know whether their factories export or not. For These factories export was handled by the company and factory staff was not involved in related decisions

[5] In a country, such as Egypt, suffering from a shortage of local food production, it is obvious that this is percentage does not reflect the actual percentage of exporting factories in the food industry population.

Factories having agreements with foreign parties are more likely to export and approximately two-thirds of these factories do . Subcontractors export the most (100%), followed by joint venture factories (85%), and factories having license agreements (46%).

The contribution of export to the total revenue of these factories follows the same trend, with subcontractors having the highest contribution, and licensees the lowest. In our sample fruit and vegetable processing factories export the most (85% of factories), followed, in order, by those producing sweets, dairy products (55%), bakery products, and bottled drinks (47%). Less than one third of the factories processing oils and fats export and only one meat processing factory out of eight was reported to export. Larger factories tend to export more than smaller ones; while only 26% of small factories export, 59% of medium factories do, followed by 75% of large factories.

I . Change in Production Volume:

More than 61 respondents interviewed, (50% of the sample) said that their factories experienced a substantial increase in production volume during the past three years. About 30% of the sample witnessed a decrease in production during the same period, and the rest have had no significant change. There is practically no difference between privately and publicly owned factories regarding recent changes in production volume. Factories having agreements with foreign parties seem to perform better in terms of production volume (Table 7) .

Table 7: Change in Production Volume, according to foreign agreement.

Foreign Agreement	Change in Production Volume						Total
	None		Increase		Decrease		
	N	%	N	%	N	%	
No	19	21	41	45	32	35	92
Yes	3	11	20	71	5	18	28
Total	22	18	61	51	37	31	120

On the aggregate, dairy, fruit and vegetable processing, and sweet factories have witnessed the highest increase in production volume. On the other hand,

the bottling and meat processing industries seem to have suffered harder times. More than 50% of these two types of factories have witnessed a substantial decrease in their production level in the last three years. Table 8 shows that smaller factories have had more instances of decrease and fewer instances of increase in production volume than larger factories. The competition seems to be tougher for smaller factories.

Table 8: Change in Production Volume, according to factory size.

Factory size	Change in Production Volume						Total
	None		Increase		Decrease		
	N	%	N	%	N	%	
< 100 employees	10	23	14	32	20	45	44
> 100 employees	12	16	45	61	17	23	74
Total	22	19	59	50	37	31	118*

* 2 cases identified

Factories using modern production technology seem to have the best performance record in terms of production volume within the last three years. The two most dynamic groups in terms of production technology are those using average and heterogenous technologies. There seems to be no stability within these groups. The production of factories using average or heterogeneous technologies is either decreasing or increasing. Only a small percentage have had a stable production volume in the recent past(Table 9).

Table 9: Change in Production Volume, according to technology.

Production Technology	Change in Production Volume						Total
	None		Increase		Decrease		
	N	%	N	%	N	%	
Traditional	4	31	4	31	5	38	13
Average	6	14	16	37	21	49	43
Modern	11	25	28	64	5	11	44
Heterogeneous	1	5	13	65	6	30	20
Total	22	19	59	50	37	31	118

II. Demand for Services

A. Service Supply and Supply Gaps

The services supplied by the FDC are also offered by a number of other agencies. The factories covered by our survey provide training, undertake analysis and receive information through a number of sources. It should be noted, however, that these services are not always satisfactory. The following section focuses on supply gaps which can be considered potential areas for FDC service expansion.

1. Training

Ninety-percent of the factories interviewed provide some form of training for their employees. Table 10 shows that only 12 factories stated that they do not provide training. A total of forty-five factories provide on-the-job training only. The rate of in-house courses increases with factory size[6]. The larger the factory, the greater the probability that it provides in-house courses. On-the-job training is relatively more important in smaller factories.

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[6] A number of in-house courses are offered at the company rather than the factory level.

Table 10: Training Type, according to factory size

Training Type	Factory Size								Total
	Micro		Small		Medium		Large		
	N	%	N	%	N	%	N	%	
In-House Courses	--	--	8	23	22	40	11	73	41
On The Job Training	4	100	29	85	44	77	12	80	89
Universities	--	--	2	6	4	7	2	13	8
National Research Institute	--	--	1	3	2	4	4	7	7
Foreign Training Center	--	--	--	--	1	2	4	27	5
Private Training Centers	--	--	--	--	5	9	1	7	6
Ministry of Industry	--	--	--	--	3	6	4	27	7
Licensor	--	--	--	--	2	4	--	--	2
FDC	--	--	1	3	3	6	--	--	4
Others*	--	--	3	9	9	17	2	--	10
Factories providing training	4	100	34	100	53	100	15	100	108
Total Factories	5		39		57		17		

* of which 8 cases are unspecified

Only about one-third of the sample provide training for their employees outside the company. The National Research Institute and universities are the prime providers of training for factories in our sample that use outside sources (Table 11). On the other hand, only publicly-owned factories use the Ministry of Industry to train their employees, while foreign training institutes are only used by private factories, the majority of which have agreements with foreign parties. It is interesting to note that while 15% of public factories in the sample use the training services of private local institutes in only one instance was a private factory reported to use such services.

Table 11:Trained Employee Category, according to factory size.

Training Category	Factory Size							
	Micro		Small		Medium		Large	
	N	%	N	%	N	%	N	%
Process Operators	4	100	28	82	49	92	13	87
Technical staff	1	25	28	82	52	98	11	73
Production Supervisors	--	--	19	56	41	77	10	67
R&D / Lab Staff	1	25	11	32	37	70	14	93
Sales and Marketing Staff	--	--	1	3	5	9	1	7
Upper Management Staff	--	--	--	--	2	4	--	--
Others*	--	--	--	--	2	4	--	--
Factories providing training	4	100	34	100	53	100	15	100
Total factories	5		39		57		17	

* Industrial safety and administrative staff

Those employee categories most often provided with training are process operators and technical staff, regardless of factory size (Table 11). Obviously, R&D and laboratory staff get more training in larger factories, not only because analytical and research facilities are more likely to be found in those factories, but also because larger factories can, in principle, afford such an investment in training.

Training is in higher demand in larger factories (Table 12). Moreover, the highest demand for training is for training for R&D, laboratory staff, and technical staff, independent of factory size. On the other hand, the demand for training process operators and production supervisors is relatively lower. Both categories are usually trained on-the-job, or in-house. The skills and information they need are considered idiosyncratic and factory specific by a number of factories. For instance, one of the respondents talking about the FDC said, "They cannot train machine operators, there are thousands of machine types. Could they really train MY people on MY machinery?"
Those factories that require help in training upper management, sales, and marketing staff are all privately owned, and use modern production technology.

Table 12: Training Needs, according to factory size.

Training needs	Factory Size							
	Micro		Small		Medium		Large	
	No	%	No	%	No	%	No	%
Process Operators	--	--	5	13	13	23	3	6
Technical Staff	--	--	9	23	25	44	6	35
Production Supervisors	--	--	6	15	18	32	4	23
R&D /Lab Staff	--	--	7	18	25	44	9	53
Sales and Marketing staff	--	--	1	3	1	2	--	--
Upper Management	--	--	1	3	--	--	--	--
Industrial Safety	--	--	--	--	1	2	--	--
Factories stating training needs	--	--	13	33	36	63	11	65
Total Factories	5	100	39	100	57	100	17	100

The relatively small percentage of factories requiring help in training does not necessarily imply that training is adequately provided. A belief that is widely held in stagnant, non-evolving industries is that "experience is more important than training", to the extent that "no training is needed because we use traditional technology".

One of the respondents justified his disinterest in training by claiming that "Training courses in Egypt are not effective. People think it is a kind of vacation, and do not take it seriously."

2. Sources of Information:

Only 39 respondents stated that their factory does not receive information on either technology, quality control, production methods, equipment, or R&D. More than two-thirds of the factories interviewed receive information and/or advice from outside parties. Most factories, however, rely on a single source of information[7]. Only about 20% of the factories of our sample used multiple sources of information. Moreover, the relative importance of suppliers as a source of information is disquieting (Table 13). The advice or information given by suppliers could safely be assumed to be biased towards the product they supply, since their prime interest is to sell

[7] The 80 factories that are already receiving information identified a total of 114 sources of information. Fifty five of these factories were found to rely on a single source of information.

their product. In fact, relying on suppliers as a single source of information keeps a factory in a passive receiver position rather than in an active information seeker mode. Unexpectedly, the reliance on suppliers as a single source of information is not limited to small sized enterprises. While 13% of the small factories of our sample rely on this source of information and/ or advice, the same applies on 14% and 12% of medium and large factories respectively.

Table 13: Sources of Information.

Source of information	Frequency	% of responses
Suppliers	38	33
Customers	17	15
Other Factories,same company	12	11
Other factories,same industry	8	7
Joint venture partners,licensor	8	7
Egyptian universities & institutes	6	5
Technology advisors	6	5
Foreign institutes or university	5	4
Conferences (local,abroad)	4	3
Others*	10	10
Total responses	114	100

*include management cosultant, literature, international organizations

A large majority of the factories needs more information. However, Table 14 shows that on the whole, factories already receiving some form of service or information are more interested in receiving more information than factories that are not already receiving information. This indicates a higher awareness of the value of information among factories already receiving information. It also indicates that these factories receiving advice or information are not fully satisfied with the quantity or quality of the information they get.

Table 14: Information Supply Gap

Need more information	Actually receiving advice or information			
	No		Yes	
	N	%	N	%
No	10	26	14	17
Yes	29	74	66	83
Total	39	100	80	100

Not unusually, the issue of quality control is even more important for factories having a license to produce under a foreign company brand name, since quality standards are often a recurrent point of difference with the licensor.

The smaller the factory, the more interested it is in information on equipment, and the larger it is the higher its demand for information concerning R&D. Production technology also seems to affect factory requirements for information (Table 17). Factories using heterogeneous technology seem to be the most keen to acquire information in general followed by factories using average technology. Factories using heterogeneous technology are particularly interested in acquiring information on technology and traditional factories are most interested in information on equipment, a subject on which modern factories are least interested. Modern factories, however, are most interested in getting advice on R&D,.

Table 17: Information Needs, according to production technology.

Information Subject	Production Technology							
	Traditional		Average		Modern		Heterogeneous	
	N	%	N	%	N	%	N	%
Technology	5	38	24	56	19	43	17	85
Production Methods	6	46	24	56	16	36	13	65
Equipment	9	69	24	56	11	25	11	55
Quality Control	6	46	26	60	21	48	10	50
R&D	6	46	21	49	23	52	13	65
Factories requiring info.	10	77	36	84	32	73	19	95
Total Factories	13	100	43	100	44	100	20	100

3. Analytical Facilities:

a. On-Premises Facilities

Factories that have no analytical facilities on the premises, over 25% of the factories sampled, are almost all privately owned (Table18), and they all have no foreign agreement of any kind (Table19). Factories with no internal analytical facilities of any kind tend to be small or micro in size, and are

In general, those factories denying a need for information are more concentrated in the private sector. While 27% of the privately owned factories interviewed did not need more information, 7.5% of the publicly owned factories did not need more information. The supply gap in information is clarified by the respondents demand for additional information on issues such as technology, production methods, equipment, quality control, and R&D. The demand is evenly distributed among these issues. As shown in Table 15, more information is required by about 50% of the factories on each of these issues.

Table 15: Information Needs

Subject of Information	Frequency	Percentage
Technology	65	21
Production Methods	59	19
Equipment	55	18
Quality Control	63	21
R&D	63	21
Total Responses	305	100

This distribution is not remarkably sensitive to ownership or product category. However, factories with agreements with foreign parties are more interested in quality control than in the other issues, while technology is the subject on which factories with no foreign agreement generally need the most information (Table 16).

Table 16: Information Needs According to Foreign Agreement

Information subject	Factories without Foreign Agreement		Factories with Foreign Agreement	
	N	% of Total	N	% of Total
Technology	53	58	12	43
Production Methods	49	53	10	36
Equipment	44	48	11	39
Quality Control	44	48	19	68
R & D	47	51	16	57
Factories requiring info.	73	79	22	79
Total Factories	92	100	28	100

more likely to use traditional rather than modern or average production technology (Table 20, 21).

Factory analytical facilities were divided into three categories: simple analysis, laboratory work for quality control, and R&D (see Appendix 4 for definitions). Our survey revealed that R&D facilities are more concentrated in publicly owned factories, factories having agreements with foreign parties, and factories using modern technology. Large factories are also more likely to have R&D facilities than small factories.

Table 18: On-Premises Analytical Facilities,according to factoryownership.

Research Facility	Public		Private		Total	
	N	%	N	%	N	%
None	1	3	30	37	31	26
Simple Analysis	4	10	7	9	11	9
Laboratory	18	46	26	32	44	37
Research and Development	16	41	18	22	34	28
Total	39	100	81	100	120	100

Table 19: On-Premise Analytical Facilities, according to foreign agreement

Research Facility	Foreign Agreement			
	No		Yes	
	N	%	N	%
None	31	34	0	0
Simple Analysis	10	26	1	4
Laboratory	27	29	17	61
Research and Development	24	11	10	36
Total	92	100	28	100

Table 20: On-Premises Analytical Facilities, according to production technology.

Research Facility	Traditional		Average		Modern	
	N	%	N	%	N	%
None	6	46	14	33	7	16
Simple Analysis	1	8	5	11	3	7
Laboratory	5	38	15	35	20	45
R&D	1	8	9	21	14	32
Total	13	100	43	100	44	100

Table 21: On-Premises Analytical Facilities, according to factory size.

Research Facility	Factory Size							
	Micro		Small		Medium		Large	
	N	%	N	%	N	%	N	%
None	2	40	20	51	9	16	--	--
Simple Analysis	1	20	5	13	4	7	1	6
Laboratory	2	40	11	28	23	40	7	41
Research and Development	--	--	3	8	21	37	9	53
Total	5	100	39	100	57	100	17	100

- Level of satisfaction with Internal Facilities

Not all the factories interviewed found the analyses performed on premises satisfactory. With few exceptions , between 40 to 50% are less than highly satisfied with the analyses provided (Table 22). The table does not include analyses mentioned in less than three instances. Those analyses are chemical analyses to determine Bromide, salt, rancidity, ash, CO2 purity, gas volume, minerals, sulphur, peroxide value, and water analysis.

Table 22: Level of Satisfaction with Analyses performed On-Premises

Activity	Factories performing activity	Not fully satisfied (%)	Not satisfied at all (%)
Physical Analysis	47	32	15
Microbiological Analysis	45	31	7
Organoleptical Analysis	52	46	10
R&D	35	40	3
Chemical Analysis to determine			
Protein	37	43	14
Fat	51	39	10
PH	13	15	8
Starch	27	30	7
Sugar	47	38	6
Moisture	64	30	6
Fibre	28	42	4

The large number of unsatisfied respondents indicates that internal analytical facilties, laboratories, and research departments require a substantial amount of upgr. ing - including the training of staff - to begin meeting the expectations of the service users.

b. Off-Premises Facilities:

According to survey results, 72% of the factories interviewed use some kind of off-premises analytical facility. When regulatory agencies such as the Ministry of Health and the General Standardization Authority , as well as analytical facilities which fall outside the factory premises but within the same company are excluded. The percentage of factories interviewed which resort to external agencies to perform analyses falls to about 50% (61 factories).

Table 23 shows the relative importance of different agencies as providers of analytical services for the factories sampled. It should be noted that the FDC tends to be a service supplier for larger companies (Table 24). This is made even clearer when the pattern of service provision is compared to that of "Egyptian Universities", where service provision does not correlate as

much with factory size. As we will see, this bias is not due to size alone, it also results from the fact a large number of FDC users are publicly owned factories, which are usually large factories.

Table 23: Off-Premises Analytical Facilities

Rank	Agency	Frequency
1*	Ministry of Health	30
2	Egyptian Universities	23
3	FDC	17
4	Within Company, Outside Factory	17
5*	Ministry of Industry (**)	15
6	National Research Institute	6
7	Private Labs	6
8	Egyptian Agricultural Authority	4
9	Foreign Institutes	4
10*	Ministry of Supply	2

* Regulatory Agencies

** Including the General Standardisation Authority

It is also clear from Table 24 that the factories which consider the Ministry of Health a provider of analytical facilities tend to be smaller in size. This is obviously not because the Ministry of Health does not monitor the production of larger factories, but rather the result of an inconsistent understanding of the concept of performing analysis externally. While respondents in larger factories understood it as a service which they seek independently in order to monitor the quality of their product - or to develop it - smaller factories saw it as a means to prove that they are meeting acceptable production standards. Some of the respondents in smaller factories do not even know what kind of analysis the Ministry performs on their products.

It is interesting to note that factories with no on-premises analytical facility do not always seek alternative means for analysis. Of the 31 factories which do not have analytical facilities on the premises, only about one quarter sought analyses off-premises. Fourteen of these factories said that no analysis are undertaken externally, and nine were aware that some analyses are undertaken by regulatory agencies.

It is instructive to quote some of the small firms on the subject, "We don't have a lab, we rely on experience, and the quality of raw materials"; "We don't have to pay for analyses, since the Ministry of Health does it for free,

It is their responsibility"; and "We only hire a third party for analysis if the Health results are negative".

Table 24: Providers of Analytical Services, according to factory size.

Service Provider	Factory Size			
	Micro	Small	Medium	Large
Ministry of Health	2	14	12	2
Egyptian Universities	--	7	10	6
FDC	--	2	8	7
Within Company, Outside Factory	1	3	11	2
Ministry of Industry	--	8	3	4
National Research Institute	--	--	6	--
Private Labs	--	--	2	2
Egyptian Agricultural Authority	--	3	3	--
Foreign Institutes	--	--	4	--
Ministry of Supply	--	--	1	1
Total number of Factories	5	39	57	17

- Level of Satisfaction with Off-premises Facilities:

The survey has revealed that, with reference to those analyses that are performed off-premises, the level of satisfaction of service users indicates that there is considerable room for provision of services of a higher quality than those currently available.Table 25 shows that the level of satisfaction with analyses performed off-premises is comparable to that of analysis performed on-premises. With few exceptions, between 40% to 50% of the sample is less than highly satisfied with the analyses. The survey indicates also that there is a gap in the market for analytical services that are not performed in Egypt. Respondents have specifically identified "Aflatoxin Analyses", some types of fat analyses, and tomato-paste chromatography as analyses that are currently either missing, inadequate, or inaccessible. Furthermore, there is also room for market expansion by widening the base of analytical service users.

Table 25: Level of satisfaction with analysis performed off-premises.

Activity	Factories performing activities	Not fully satisfied (%)	Not satisfied at all (%)
Physical Analysis	39	23	2
Microbiological Analysis	47	40	6
Organoleptical Analysis	23	35	4
R & D	11	27	--
Chemical Analysis to determine:			
Moisture	37	35	
Fat	34	38	8
Protein	29	48	12
Fiber	21	48	7
Starch	20	35	9
Sugar	32	31	10
Toxins	3	33	8
Water Analysis	4	50	50

4. The FDC As a Service Provider

The majority of FDC clients are public sector factories. More than two thirds of the publicly owned factories in our sample, if not actually using FDC services, had at least heard about the FDC. Less than a quarter of privately owned factories, however, even knew what the FDC was (Table 26)

Table 26: Knowledge of FDC according to ownership.

Ownership	Knowledge of FDC				Total
	No		Yes		
	N	%	N	%	
Public	11	28	28	72	39
Private	62	77	19	23	81

Factory location does not have an effect on knowledge of the FDC. This is a logical result of the information channels the FDC uses (Table 27).

Table 27: FDC information Channels, according to factory ownership.

Information Channel	Public	Private	Total
Colleague/Entrepreneur	6	12	18
Read about it in newspaper	4	1	5
Public Sector Authority for Food Industry	6	--	6
Cooperated in establishing FDC	5	1	6
FIC	--	3	3
Recieved Correspondence from FDC	4	2	6
Others	3	--	3
Total	28	19	47

None of these information channels is location bound. Table 28 shows, however, that the larger the factory is, the more likely it is to know about the FDC.

Table 28: Knowledge of FDC, according to Factory Size.

Knowledge of FDC	Factory Size							
	Micro		Small		Medium		Large	
	N	%	N	%	N	%	N	%
No	4	80	30	77	35	61	13	18
Yes	1	20	9	23	22	39	14	82
Total	5	100	39	100	57	100	17	100

The use of FDC services follows knowledge about it for private sector factories more than for public sector factories. While about 80% of the

private factories knowing about FDC use its services, only about 60% of the public factories that know about FDC do so (Table 26, 29). Table 29 also shows that most of the factories that use FDC services started doing so after 1988. It seems that the transfer of the FDC to its new premises was accompanied by good media coverage and a fruitful information campaign.

Table 29: Date of first using FDC according to ownership.

Year in which services were first used	Number of Factories		
	Public	Private	Total
Unspecified	2	--	2
1978	1	3	1
1985	--	--	3
1986	1	--	1
1987	--	--	--
1988	8	4	12
1989	2	6	8
1990	2	2	4
Total	16	15	31

The FDC is not a major provider of training for factories in our sample (Table10). It does, however, provide analytical services for a great number of factories, especially large and publicly owned ones (Table 24).

B. Problems Encountered by the Food Sector:

In the last section, the analytical, training and information services supplied to the food industry in Egypt were assessed. As we have seen, a number of supply gaps exist that can be considered potential areas for FDC service expansion.

In this section we will address another candidate area for market expansion, namely, the problems encountered by the food industry. Helping to solve these problems by upgrading factory human and technical capacities, or by providing services designed to deal with these problems, would meet the ultimate objective of the FDC: that of promoting the development of the Egyptian food industry.

1. Relative Importance of Problems

The respondents were provided with a list of possible problems, and were asked to identify the major and minor problems their factories face. The aggregation of the answers provided a general ranking of the gravity of problems encountered by the food industry (Table 30).

The five major problems were found to be first, securing the supply of raw materials; second, securing the right quality of raw materials; third, acquiring tools and equipment; fourth, hiring skilled labor; and fifth, packaging problems. These problems are closely followed in importance by environmental problems, and the repair and maintenance of equipment.

Table 30: General Ranking of Problems encountered by the Food Industry

Rank	Problem	Major Problem	Problem (Major or Minor)
1	Acquiring Raw Materials	37	65
2	Quality of Raw Materials	28	61
3	Acquiring Tools/Equipment	25	48
4	Hiring Skilled Labor	25	43
5	Packaging	23	56
6	Wastewater and Environmental Problems	20	44
7	Repair/Maintenance of Equipment	14	43
8	Technical Know-how (Prod. Process)	14	29
9	Technical Know-how (Prod Analysis)	13	29
10	Quality of Water Supply	10	24
11	Financial Problems	9	9
12	Administrative Problems	8	9
13	Quality of Final Product	7	21
14	Marketing Problems	7	7
15	Transportation of Exports	3	3
16	Use of By-products	2	3
17	Electrical Supply	2	2
18	Securing Imported Material For Analysis	1	2
19	Stability of Labor Force	1	1

Acquiring tools and equipment is ranked first among the major problems facing publicly owned factories. This is a reflection of the slow rate of replacement and renovation of equipment typical of state-owned enterprises. On the other hand, securing raw material causes less problems for public sector factories than for the private ones. The raw material supply channels of state-owned enterprises seem to be functioning more effectively than those of private sector factories. However, both sectors give a high rank to problems related to the quality of raw materials (Table 31).

The repair and maintenance of equipment has a relatively higher importance for factories using traditional technology, as opposed to those with average or modern technology. Older machines are more likely to have maintenance problems. These problems are ranked even higher in factories using heterogeneous technology (Table 32).

The relative importance given to different problems is a reflection of the circumstances of each production sector (Table 33). Looking at the problems faced by bottling factories demonstrates how factory problems can be production- or product-specific. For instance, the high ranking given to financial problems by bottling factories is in large part a result of the shrinking market these factories face. The quality of raw materials, on the other hand, is not an issue for bottling factories since most of them receive concentrates from their licensors abroad. By the same token, the quality of the water supply is an important and essential problem for bottling factories, but may not have as much importance for a factory involved in oil and fat processing. Marketing problems cited by dairy factories result from the current competitive market for dairy products, while packaging problems and the quality of raw materials, ranked nineth and tenth, do not seem to have the same importance for dairy factories as for other factories. Finally, the final product quality is seen as a major problem by respondents in meat processing factories due to the sensitivity of their products.

Table 31: Industry Problems, Ranked according to Ownership.

Rank	Public	Private
1	3*	1
2	2	2
3	4	5
4	6	4
5	1	3

* For easier reference, these numbers reflect the aggregate ranking in Table 32.

Table 32: Industry Problems, ranked according to production technology.

Rank	Traditional	Average	Modern	Heterogeneous
1	1*	1	5	1, 2
2	3	2	6	--
3	5	4	1	7
4	2	3	4	3
5	7	9	3, 2	4

* These numbers reflect the aggregate ranking in Table 30.

Table 33: Industry Problems, ranked according to production category

Rank	Bakery	Bottled Drinks	Dairy	Fruit & Vegetable Processing	Meat	Oils & Fat Processing	Sweets
1	2*	4	3	1,5	1,2	1	1
2	5	3	1	--	--	2	2
3	4	11	7	2,6	5	6	6
4	1	10	4	--	3,13	3,4	5
5	6	1	14	3,4	--	--	3

* These numbers reflect the aggregate ranking in Table 30.

Our sample shows that, on the whole, factories located in Cairo and Alexandria ranked the problem of hiring skilled labor relatively higher than those situated in the Delta, or in smaller cities (Table 34). This situation could be due to the fact that, although large cities typically have a wider supply of skilled workers than small ones, the industrial concentration in Cairo and Alexandria is higher than the relative availability of skilled labor; while in smaller cities the low concentration of industrial activity does not exhaust the supply of skilled labor available.

Table 34: Problems in Hiring Workers, ranked according to factory location

Rank	Cairo	Alexandria	Eastern Delta	Western Delta
1	1*	1	1	2
2	3,4	2	5	1
3	--	4	6	3
4	6	5	2,3	6
5	5	3	--	5

* For easier reference, these numbers reflect the aggregate ranking of Table 30

2. Availability of Qualified Workers

Public and Private sector factories have the same level of problems in hiring skilled workers. Public sector factories, however, have difficulties in hiring unskilled labor as well. As a respondent in a public sector factory explained, "It is difficult to find unqualified people willing to work for salaries paid in the industrial sector, which are lower than those paid to

construction workers." The private sector seems to have overcome this salary barrier.

Table 35: Problems in hiring workers, ranked according to product category.

Production Category	Problems in Hiring Workers				Total Factories
	Skilled		Unskilled		
	N	%	N	%	
Bakery	7	47	1	7	15
Bottled Drinks	6	40	2	13	15
Dairy	4	28	1	7	14
Fruit and Vegetable Processing	6	43	--	--	14
Meat Processing	2	25	1	12	8
Oil and Fat Processing	6	35	2	12	17
Sweets	4	20	--	--	20*

* one invalid answer

From the above table, it can be seen that factories producing sweets experience the least problems in hiring skilled workers. In fact, this issue does not even rank among the first ten problems for them. Only 20% of the respondents in these factories said that they experience problems related to hiring skilled workers, compared to 47% of the bakery respondents.

Table 36: Problems in hiring workers, according to factory ownership.

Ownership	No	Problems in hiring workers				Total
		Skilled		Unskilled		
		N	%	N	%	
Public	25	12	32	8	21	38 *
Private	52	25	31	3	4	80 *

* valid answers

3. Packaging Problems

Packaging was revealed to be one of the major problems faced by the food industry in Egypt (Table 37). Complaints about packaging and packaging material are not only technical, but include complaints about the difficulty of importing material as well. Packaging, a primary component of the final

consumer product, is often imported, either because adequate packaging is not produced locally (milk cartons for example) or because of the lower standard of local production as compared to imported material (such as galvanized tin). While the import of packaging materials increases the cost of the final product, import restrictions do not always benefit the consumer. Such restrictions may, in fact, be to the disadvantage of the consumer when they force factories to use the domestic product. Locally galvanized tin for example, rusts, and could cause health hazards.

A number of packaging problems identified by respondents are shown in Table 37. Types of packaging are ranked according to the percentage of cases in which problems have occured. Cans, as a package type, have the highest percentage of problems. Corrosion and faulty sealing are the most common problems encountered; can-corrosion was known to be a direct result of the poor quality of the internal coating. Faulty sealing was found to be the most common problem in almost all types of packaging. Mechanical strength is also a recurrent problem in flowpacks, glass bottles, folding cardboard boxes, and cups.

Table 37: Packaging Problems, Occurence and Types.

Package	N*	% reporting problems	Problem Types											
			1	2	3	4	5	6	7	8	9	10	11	12
Cans	38	53	7	1	2	9	2	–	–	–	–	1	–	3
Flow Packs	44	32	–	4	3	4	2	–	1	–	–	–	–	2
Bottles/Jars	49	29	2	4	1	4	3	–	–	1	1	–	–	1
Sacks	7	29	1	–	–	–	1	–	–	–	–	–	–	–
Aluminum paper	18	28	–	–	–	3	–	–	1	1	–	–	–	–
Pouches	68	24	–	2	–	6	–	–	2	1	1	–	1	5
Folding card-board boxes	82	22	–	6	4	4	1	–	–	2	–	–	–	2
Cups	23	22	–	3	1	1	–	–	–	–	–	–	–	3
Plastic boxes	10	20	–	1	–	1	–	1	–	–	–	–	–	–
Waxed paper	4	– –	–	–	–	–	–	–	–	1	–	–	–	–
Containers	3	– –	1	–	–	1	–	–	–	–	–	–	–	–

* number of factories using package

1 = Corrosion
2 = Mechanical Strength
3 = Water & Vapor Transfer
4 = Sealing
5 = Appearance
6 = Increase in Price
7 = Printing
8 = Thickness
9 = Sterilization
10 = Enamel
11 = Color changes
12 = unspecified

Packaging appearance was also considered an important problem, justified by the effect appearance has on customer perception of the product. While ink that smears on pouches and aluminum paper does not affect the product itself, it is considered a problem by some respondents as it affects product image. The only respondent who mentioned thickness as a problem (for pouches) explained that the system of polyethyline production in Egypt provides less control on the thickness of blown films.

4. Problems of Chemicals and Additives

Around 20% of the respondents stated that their factories experience problems with chemicals and additives. The availability of these materials is the most recurrent problem. As these materials are often imported they are subject to occasional shortages. The quality of these materials is also a problem. Additives, for instance, are often delivered by suppliers in a diluted form. Moreover, specifications standards for additives in Egypt are not high. One of the respondents elaborated by arguing that, although he knows that the quality of coloring agents allowed by specifications is not high, he uses them when quality coloring agents are not available.

Furthermore, the low standards of Egyptian specifications are not acceptable in all countries. This places exporting factories in a difficult dilemma. Following European specifications for all their production would make products too expensive to be competitive in the local market, while not following these specifications limits export ability (by limiting product acceptablility abroad).

Table 38: Problems of Chemicals and Additives

Problem	N		%	
No	95		79	
Yes	25		21	
Availability		9		36
Specs		6		24
Quality		8		32
Inadequacy of proper labaratory analysis		4		16
Storage		1		4

5. Exporters' Problems

As regards those problems specifically faced by factories that export, it was found that packaging is a more prominent problem than product quality. Furthermore, administrative and bureaucratic problems rank much higher than those of product or packaging quality (Table 39). Administrative problems are followed closely by marketing problems. It is instructive to note that manufacturing problems represent only a small percentage of the problems faced by exporters. This ranking does not necessarily reflect the unimportance of manufacturing problems, but it does point out a characteristic of the Egyptian environment today where the magnitude and urgency of administrative problems often sends these problems to the background.

Table 39: Exporter's Problems.

Problem	Frequency
Administrative	21
Marketing	20
Packaging	13
Product Quality	5
Transportation	4
Competition	2

C. Direct Demand for Services

The problems and supply gaps faced by the food industry are indicators of the potential demand for training, information, analysis, and research services. These indicators could provide suitable guidelines for FDC service expansion.

In the next section, these guidelines are complemented by those services specifically demanded by the respondents. The integration of these three dimensions, i.e. supply gaps, industry problems, and outright demand, will provide a complete picture of the directions in which the FDC should develop its services, in order of priority, to meet the demands of its market.

1. General Ranking of Service Demand

Respondents were provided with a list of 25 posssible services that could be provided by an upgraded FDC. Each service was given a grade of importance, according to whether the respondent considered it a major service, a minor service, or of no use to the factory he or she represents. The aggregation of these answers has permitted us to priority rank services for the sample at large (Table 40). It should be noted that a number of respondents categorized all of the possible services as major services. It is also remerkable that the difference between services is minimal. The list of possible services was divided into seven groups, as follows:

I. Quality control of raw materials, intermediate, and finished products;
II. Services related to packaging material;
III. Trouble shooting in factories;
IV. Product development using the FDC pilot plant;
V. Information services;
VI. Training services; and

VII.Advice to industry (consulting).

The general service ranking reflects the undisputed importance of services related to packaging material and information. These two services are followed by product development using the FDC pilot plant, with special emphasis on the study of material inputs in production (raw materials and additives), as opposed to the study of production processes and parameters. Training of laboratory and research personnel is ranked far higher than training for plant operators.

Table 40: General Ranking of Possible Services of FDC

Rank	Type of services	Group	Major	Major+Minor
1	Sensitivity of product quality to specific packaging	II	50	71
2	Literature research and dissemination	V	49	81
3	Microbiological analysis	I	48	71
4	Chemical analysis	I	47	81
5	Seminars and conferences	V	45	84
6	Quality control/Testing of packaging material	II	40	65
7	Training for laboratory/research personnel	VI	40	66
8	Suitability of raw material for industry	IV	38	61
9	Effect of additives on characteristics	IV	35	55
10	Advice on wastewater or other pollution prolems	VII	30	43
11	Process research using pilot plant	IV	28	57
12	Trouble shooting on product quality problems	III	27	44
13	Advice on systematic quality control	VII	27	45
14	Physical analysis	I	23	49
15	Training for plant operators	VI	??	44
16	Effect of process parameters on product quality	IV	21	44
17	Trouble shooting in technical problems	III	20	40
18	Trouble shooting in hygienic problems	III	19	36
19	Advice on equipment selection	VII	19	31
20	Advice on process analysis	VII	18	41
21	Advice on modification in process	VII	18	32
22	Advice on design of lay-out	VII	18	35
23	Organoleptical analysis	I	15	39
24	Trouble shooting on process problems	III	14	37
25	Advice on engineering	VII	12	24

Only pollution problems and systematic quality control are considered relatively important advice areas. However, "advice" and "trouble shooting" generally have the lowest rank on the service importance scale. We suggest that there is a preference for services that do not require the direct interference of external parties in the operation of the factory, things which consulting jobs usually entail and require. It is indicative that public sector factories (who mainly use heterogenous production technology) are very interested in studying production processes at the pilot plant (Table 41)[8]. This is not surprising since the production technology these factories use is known to cause problems in process flow and balance. It is, rather, supportive of our hypothesis that these factories have ranked advice on process analysis fifteenth, and trouble shooting in process problems nineteenth. These activities could be helpful in solving their problems, but

[8] This service is ranked 6th by heterogeneous factories, 11th by factories using average technology, 13th by traditional factories and 16th by modern factories.

In contrast to "studying production processes at the pilot plant", they involve divulging detailed knowledge of the actual workings of the factory[9].

Table 41: The five most valued services according to ownership

Rank	Factory Ownership			
	Public		Private	
	Service	Group	Service	Group
1*	2	V	1	II
2	5	V	3	I
3	7	VI	4	I
4	11	IV	6	II
5	4	I	8	IV

* For easier reference these numbers reflect the aggregate ranking of Table 40

Not surprisingly, those factories with decreasing levels of production are those who consider trouble shooting of product quality problems a major service(Table42).

Table 42: The five most valued services according to change in production level.

Rank	Change in Production Level					
	No		Increase		Decrease	
	Service	Group	Service	Group	Service	Group
1	1*	II	2	V	8	IV
2	2	V	3	I	7	VI
3	5	V	4	I	1	II
4	4	I	5	V	12	III
5	3	I	1	II	5	V

* These numbers reflect the aggregate ranking of Table 40

Private sector factories are more interested than public sector factories in specific services related to actual production. While private sector

[9] Lack of confidentiality will be seen to be one of the major problems expected with the FDC.

factories require services related to packaging material and analysis for quality control, the interests of public sector factories are limited to the general areas of information services and training of laboratory staff.
On the aggregate, the importance given to services related to packaging material is not sensitive to product category (Table43).

Table 43: The five most valued services according to production category

Rank	Bakery		Bottled Drinks		Fruits&Veg. Processing		Meat Processing		Oils and fats Processing		Sweets	
	Service	Group	Service	Group	Service	Group	Service	Group	Service	Group	Service	Group
1*	1	II	7	VI	4	I	3	I	4	I	4	I
2	6	II	2	V	1	II	15	VI	2	V	1	II
3	3	I	11	IV	5	V	7	VI	8	IV	3	I
4	5	V	5	V	3	I	9	IV	6	II	9	IV
5	18	III	3	I	6	II	1	II	9	IV	8	IV

The only exception to this rule is bottling factories for which these services do not rank among the first ten services. Dairy and bakery factories are the factories most interested in services related to packaging material. Information services are of interest to all categories of factories, except meat processing factories. Microbiological analysis is considered most important for meat processing and baked product factories, and has a high ranking for all other factory categories as well, except for oil and fat processing factories for which it is ranked twelfth. Chemical analysis, on the other hand, takes on a primary importance for factories processing fruits and vegetables, oils and fats, and sweets.

Training of laboratory staff is ranked first by bottling companies. This is probably due to the stringent quality control standards required by foreign licensors. Meat processing factories not only require training of laboratory staff, but also consider training of process operators very important, probably as a result of the sensitivity of their product.

Factories producing sweets, those processing oils and fats, as well as bakery producing factories are more interested in the effect of additives on product characteristics. Bottling factories were the most interested in process research using the FDC pilot plant.

Table 44 shows that the demand for services is sensitive to the level of on-premises analytical facility. The interest in information services rises with the level of analytical facility. It seems that a higher facility level is accompanied by a reciprocal rise in the general appreciation of the value of information in these factories. Moreover, the importance of analytical services rises with the introduction of simple analysis capabilities[10], which indicates a higher awareness of the importance of analysis. Furthermore, training of laboratory staff has a consistently higher rank with higher levels of analytical facility.

[10] Chemical and microbiological analyses are ranked sixth and eighth, respectively by factories having R & D facilities on premises.

Table 44: The five most valued services, according to the level of on-premises facility.

Rank	No Research Facility		R & D		Laboratory		Simple Analysis	
	Service	Group	Service	Group	Service	Group	Service	Group
1	1*	II	5	V	2	V	8	IV
2	9	IV	7	VI	5	V	3	I
3	4	I	2	V	4	I	4	I
4	3	I	6	II	3	I	9	IV
5	12	III	10	VII	7	VI	2	V

* These numbers reflect the aggregate ranking of Table 40

2. Demand for Training

On the whole, respondents in the food industry consider the training of high level staff as the most important type of training needed by their factories. Training for machinery maintenance personnel was also ranked relatively high. Training of other medium and lower level staff was not considered as important (Table 45).

Table 45: Demand for Training, general ranking

Rank	Training Type	Frequency	
		Very Interested	Somewhat Interested
1	Management, marketing, export	52	18
2	Technically oriented high level staff	35	27
3	Maintenance of machinery	32	18
4	Machine operators	19	24
5	Medium level staff (food technicians)	17	28
6	Process operators	17	24

This pattern of priorities is extremely powerful. It is not influenced by ownership, production technology, change in factory production level, or whether or not the factory exports its products. However, a slight variation exists in this pattern, across different ranges of factory size (Table 46).

Table 46: Demand for Training , ranked according to factory size

Factory size	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Small	1*	3	2	4	6	5
Medium	1	2	3	4	5	6
Large	1	2	3	5	6	4

* These numbers reflect the aggregate ranking of Table 45

Larger factories seem to have a higher interest than smaller ones in training food technicians. Moreover, the importance of training machine operators diminishes for larger factories. The highest variation in training interests is seen to depend on the category of product in which a specific factory specializes (Table 47).

Table 47: Demand for Training, ranked according to Product Category.

Product Category	Rank					
	1*	2	3	4	5	6
Bakery Products	2	1	6	4	5	3
Bottling	2	1	3	4	6	5
Dairy	1	3	5	2	4	6
Friut &Veg.Processing	1	2	5	3	4	6
Meat Processing	3	1	2	6	4	5
Oils & Fats Processing	1	6	3	2	4	5
Sweets	1	3	5	4	2	6

* These numbers reflect the aggregate ranking of Table 45

Training process operators has a higher than average ranking for factories in the fields of bakery and meat processing and oil processing. On the other hand, training food technicians seems to be of lesser importance for bottling, meat processing, and oil processing factories. Moreover, factories producing sweets and dairy products are less interested than average in training technically-oriented, higher-level staff. Specific demands for training were expressed by a number of respondents. Training laboratory staff was required by seven respondents, followed by training for product development[11].

3. Demand for Research

The demand for research has proven to be consistent with the priority ranking of FDC possible services. Quality evaluation of packaging is the type of research in which respondents are most interested. Moreover, the evaluation of manufacturing processes and the study of production problems, both involving the interference of an outsider in actual factory functions, are ranked lowest in demand (Table 48). This lack of confidentiality will be seen to be one of the major problems expected with the FDC.

[11] This was requested by only two respondents from private sector, meduim sized exporting factories, using higher than average production technology.

Table 48: Demand for Research,general ranking

Rank	Type of Research	Frequency	
		Very interested	Somewhat interested
1	Quality evaluation of packaging	46	28
2	Production of world market popular food items	40	23
3	Environmental problems	32	21
4	Quality evaluation of chemicals bought	31	23
5	Evaluation of manufacturing process	30	27
6	Tackling production problems	25	21

Research on the quality evaluation of chemicals is given greater importance by exporting factories. This can be explained by the discrepancy between Egyptian specifications, and those acceptable in importing countries (Table 49). Furthermore, there is a clear relationship between interest in this type of research and the level of analytical facility in the factory (Table 50).

Table 49: Demand for Research, ranked according to exporting status.

Exporting Status	Rank					
	1	2	3	4	5	6
Non-Exporters	2*	1	5	3	6	4
Exporters	1	4	2	5	3	6

* These numbers reflect the aggregate ranking of Table 48

Table 50: Demand for Research, ranked according to the level of on-premises analytical facility.

Level of Analytical Facility	Rank					
	1	2	3	4	5	6
None	2*	1	6	5	3	4
Simple Analysis	3	6	2	1	4	5
Lab	1	2	4	3	5	6
R & D	1	4	2	5	3	6

* These numbers reflect the aggregate ranking of Table 48

Factories with higher levels of analytical facilities are more interested in quality evaluation of chemicals, since they are capable of applying this type of research.

Table 51: Demand for Research,ranked according to Production Technology.

Production Technology	Rank					
	1	2	3	4	5	6
Traditional	4*	2	3	5	6	1
Average	2	5	1	4	6	3
Modern	4	3	6	2	5	1
Heterogenous	2	4	6	5	1	3

* These numbers reflect the aggregate ranking of Table 48

Factories with average or heterogenous technology are more interested in research concerning manufacturing processes and production problems (Table 51). These factories seem to be in a relative state of disequilibrium, which makes them more receptive to the possible changes preceded by such types of research. The same could be taken to apply for factories with decreasing levels of production (Table 52). In other words, production problems that could be expected in any factory are often hidden by satisfactory production volumes.

Table 52: Demand for research,ranked according to change in the level of production.

Change in Production Volume	Rank					
	1	2	3	4	5	6
No Change	1*	4	3	6	5	2
Increase	2	1	4	5	3	6
Decrease	2	1	6	3	5	4

* These numbers reflect the aggregate ranking of Table 48

Table 53: Demand for Research, ranking according to product category

Product Category	Rank					
	1	2	3	4	5	6
Bakery products	1*	2	4	5	3	6
Bottled Drinks	5	6	4	2	1	3
Dairy products	1	4	2	5	3	6
Fr. & Veg. Process.	1	4	2	3	5	6
Meat Process.	1	5	2	3	6	4
Oils & Fat Process.	1	3	5	2	4	6
Sweets	1	2	3	5	6	4

* For easier reference, these numbers reflect the aggregate ranking of Table 48

In contrast to other factories, bottling factories have ranked the evaluation of manufacturing processes and the tackling of production problems as the two most important research areas. Bottling factories are also exceptional in giving a low rank to "the production of world market popular food items" as a research area. This is an obvious result of the high percentage of these factories working under license agreements which secure for them this type of research. Furthermore, bottling factories gave a minor importance to packaging related research. On the other hand, dairy product and fruit and vegetable processing factories seem to be the most interested in research about quality evaluation of chemicals[12].

In general, publicly owned factories are more interested in research about environmental problems than privately owned ones (Table 54). Moreover, public sector factories seem to be marginally more interested in seeking FDC advice on environmental problems than private sector ones. (59% of public factories would seek environmental advice as compared to 55% of private factories). However, this does not imply that the type of ownership influences the interest in advice on this subject, it is rather a reflection of the difference in size between public and private factories.

[12] A few respondents had specific demands for research. Marketing research was cited by eight respondents, mostly private sector and almost with no foreign agreement. Other respondents were interested in product development (5 respondents), and the optimum use of material inputs and by products (3 respondents). Other demands included specific tests (6 respondents), hygiene (1 respondent), local production of packaging material (1respondent), and research on fruit dehydration (1 respondent).

Table 54: Demand for research, ranked according to factory ownership.

Ownership	Rank					
	1	2	3	4	5	6
Public	3*	5	2	1	4	6
Private	1	2	4	3	6	5

*These numbers reflect the aggregate ranking of Table 48

The data suggests that there is a clearer relationship between factory size and interest in advice on environmental problems. The larger the factory is, the more it is interested in such advice (Table 55). This may be due to the fact that larger factories have the capabilities to influence the surrounding environment. In the 10th of Ramadan Industrial City, for instance, where there is no municipal garbage disposal system, individual companies take charge of their own waste. This is something that smaller companies cannot afford to do.

A respondent representing a large public sector factory in the Delta region stated that "although we are aware of the environmental harm that we are causing by dumping wastewater in channels used for drinking water downstream, we are unable to invest to solve problems not directly related to factory performance." On the other hand, one respondent from a medium sized privately owned factory clarified that "a small factory cannot do much alone; environmental problems need collective action. Advice alone is not helpful."

Table 55: Seeking FDC Advice on Environmental Problems, according to factory size.

Seek advice of FDC on environmental problems	Factory Size							
	Micro		Small		Medium		Large	
	N	%	N	%	N	%	N	%
No	5	100	20	53	32	39	4	23
Yes	--	--	18	47	34	61	13	77
Total	5	100	38*	100	56*	100	17	100

* Valid answers

4. Demand for FDC Information Activities

The FDC information activities that interested respondents the most are those presented by foreign specialists (Table 56). With reference to FDC staff lectures, lectures on "production technologies" were ranked first.

Table 56: FDC Information Activities,general importance ranking.

Rank	Activity	Topic	Presented by	Frequency	
				Interested	Very Interested
1	Lecture	Food Technology	Foreign Specialist	86	67
2	Lecture	International Food Market	Foreign Specialist	84	60
3	Lecture	Production Technologies	FDC Staff	73	43
4	Demonstration	Machinery	Manufacturers	68	43
5	Lecture	Quality Testing	--	74	42
6	Demonstration	FDC Testing Facilities	FDC Staff	69	34
7	Demonstration	Chemical Products	Manufacturers	56	29
8	Lecture	FDC Training Facilities	FDC Staff	58	26
9	Lecture	Use of Additives	FDC Staff	44	18

Factories using traditional technology or modern technology are less interested in lectures on production technologies. Factories using average or heterogeneous technologies, being in a state of relative disequilibrium, are more receptive to information on production technology (Table 57).

Table 57: FDC information activities, ranked according to production technology.

Production Technology	Rank								
	1	2	3	4	5	6	7	8	9
Traditional	2*	4	5	7	3	1	6	9	8
Average	1	2	3	4	5	6	7	8	9
Modern	1	2	6	5	3	4	7	8	9
Heterogeneous	2	1	5	3	4	7	6	8	9

*These numbers reflect the aggregate ranking of Table 56

The interest in demonstrations of machinery by manufacturers decreases consistently with higher levels of production technology. Lectures on

quality testing are of a higher than average interest to exporters and to respondents from public sector factories (Tables 58, 59).

Table 58: FDC Information Activities, ranked according to factory ownership

Ownership	Rank								
	1	2	3	4	5	6	7	8	9
Public	1*	2	5	4	3	6	7	8	9
Private	1	2	3	4	5	6	8	7	9

* These numbers reflect the aggregate ranking of Table56

.Table 59: FDC information activities, ranked according to exporting status

Exporting Status	Rank								
	1	2	3	4	5	6	7	8	9
Non-Exporter	1*	2	3	5	4	6	7	8	9
Exporter	1	2	5	4	3	6	7	8	9

*These numbers reflect the aggregate ranking of Table 56

Table 60: FDC image, among its users according to factory ownership

Statement	Public			Private			Total		
	Agree	Disagree	Do not know	Agree	Disagree	Do not know	Agree	Disagree	Do not Know
1. FDC has adequate facilities to assist my business	11	--	2	12	--	--	23	--	2
2. FDC staff are well trained food specialists	4	2	7	2	6	3	6	8	10
3. FDC is responding accurately to my problems	5	2	5	7	5	--	12	7	5
4. Facilities of FDC are too expensive	8	2	3	9	3	1	17	5	4
5. Quality of FDC services will increase soon	6	--	9	5	1	7	11	1	16
6. Operating my business is easier by using FDC	7	1	6	7	2	3	14	3	9
7. FDC attitude is much too bureaucratic	2	8	3	6	4	1	8	12	4
8. FDC provides adequate support and advice	4	1	7	5	5	2	9	6	9
9. FDC gives little attention to my problems & jobs	3	5	6	4	6	2	7	11	8

III. FDC Image:

As already seen in Table 29, more than half FDC service users are public sector factories. Larger factories were also seen to be more likely to know about the FDC and to use its services. FDC information channels were considered ineffective by a number of private sector respondents who did not know the FDC. These respondents conjectured a different reason for their ignorance of the FDC. The following comments were given by some of them:

> "It is incredible that the FDC has been operating for so many years and we never heard of it.... They must be very well funded, and do not need the business."
>
> "It is the FDC's fault that we do not know anything about them, even though we have been operating since 1985. We are a leading private firm, which leaves me under the impression that they only serve the public sector."
>
> "We are small, do they care about small factories?"

Most FDC service users started using it from 1988 onwards. More than 60% of FDC users in our sample are bottling factories and factories processing fruits and vegetables. None of the meat processing factories in our sample used FDC services.

FDC users were asked to give their opinion in a number of statements which help reveal their perception of the FDC (Table 60).

It was found that most respondents agree that the FDC has adequate facilities to assist their business, that operating their business becomes easier by using FDC, and that FDC provides adequate support and advice. However, the majority of the sample found that FDC service fees are too expensive.

More than half of the respondents could not give an answer to the statement: "The quality of FDC services will increase soon". However, those who agreed with this statement found that conducting this survey to familiarize the FDC with food industry problems and demands is an indicator of the future upgrading of FDC services. Further analysis indicates that while almost 50% of public sector respondents claimed they did not know whether FDC staff

are well trained food specialists, respondents in private factories generally disagreed[13]. A manager of a large private sector factory said that: "FDC equipment and know-how are below the standards of our factory, they are not as well staffed or equipped". Another private sector manager commented that while the FDC has a lot of equipment, he believes that its staff are not trained enough to use it. FDC staff were seen by a third manager to be adequate for routine duties, but not as well trained for more complicated problems. Futhermore, a public sector quality control manager said: "The only thing that would make us send anything to them for analysis is that they have more sophisticated instruments than ours. After all, we are their seniors."

Private sector respondents tended to consider the FDC's attitude much too bureaucratic. Moreover, survey results indicate that small factories are more likely to find the FDC's attitude bureaucratic than larger factories. The FDC procedures considered too bureaucratic by smaller private sector factories are probably better justified by respondents from larger public sector factories.

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[13] Our observation was that public sector respondents were reluctant to criticize the FDC, probably because of the personal network that ties them to FDC staff. Therefore, the response: " do not know" from a public sector respondent should not be taken at face value.

Table 61: Ranking of problems expected by factories in relation to dealing with the FDC.

Rank	Problem	Frequency	% of Responses
1	Price	64	26
2	Bureaucracy	51	21
3	Confidentiality	41	17
4	Quality of Services	40	16
5	Staff know - how	33	13
6	Time	7	3
7	Lack of communication	4	2
8	Distance	3	1
_	Others	3	11
Total number of Responses		246	100

Only 14 factories (12%) did not expect problems in dealing with FDC. High prices and overly bureaucratic procedures are expected to constitute the two major problems in using FDC services (Table 61). Price is sometimes considered a limiting factor for using FDC services. A public sector manager who knew about the FDC never used its services because, even though he thought it was useful, he found it very expensive. Confidentiality was also expected to be a major problem by both private and public sector factories. A closer look, however, reveals that private sector factories are more worried about confidentiality (20% of total responses) than public sector factories (10% of total responses). A private sector manager stated his opinion about this issue very frankly, saying "confidentiality in the FDC is impossible, since it is part of the Ministry of Industry".

Offering high quality services was also considered to be quite a difficult task for the FDC since, as one respondent stated, "the FDC will have to specialize in each and every sector of the food industry, and since this is not possible, they will have to be generalists". One respondent from a leading bottling factory reiterated the same idea in an extremely subtle fashion by saying "FDC staff? They are masters in canning." Another respondent said, "My experience is that the FDC offers an incomplete service. People are not only interested in test results, but also in the interpretation of results and recommendations. They should also be

informed about experiment parameters. These are all things the FDC does not provide". A recurrent complaint revolves around the time taken by the FDC to undertake an analysis. A comparison between the time taken by the FDC, and any other analytical lab performing the same analysis is not in the FDC's favor. As one respondent reported :"The FDC takes 10 days to perform the same analysis done by Tanta University in 2 days, at a lower price".

Even though respondents expected and articulated a number of problems, 85% of them said that they consider using FDC services; only 5% said they would not, and 10% did not know. Those factories who do not consider using the FDC are located either in Cairo or Alexandria. This is probably due to the easily accessible alternatives available to factories located in such large cities. Most of these factories are privately owned, and they all have no foreign agreements. The factories whose respondents did not know whether they would use FDC services or not are also more likely to be located in Cairo or Alexandria, to be of the private sector, and to have no agreement with foreign parties.

The survey revealed that for factories with on-premises analytical facilities, the higher the level of the facility, the less likely it is to consider using FDC services. 100% of the factories having capabilities for simple analysis, 90% of the factories with laboratories, and 85% of factories with R&D facilities said they consider using FDC services. Factories with no analytical facilities on the premises are the least likely users of FDC services (71%). Those who do not consider using FDC services think that a government related agency will not be useful (3 respondents); consider their own facilities to be sufficient (2 respondents); or have other sources of information (2 respondents).

The reasons for using FDC services seem to be primarily to acquire more knowledge and information (40% of total responses), followed by the lack of equipment or the need for independent results or opinions (20% of responses each). Only 10% of the responses mentioned capacity shortage, lack of skilled workers, or lack of knowledge as reasons for using the FDC.

Easy accessibility and greater affordability of services, with prices lower than alternative providers, were considered necessary conditions for using FDC services. One exporter added that the FDC certificate should be one that is accepted and recognized in foreign countries, in order to encourage him to use its analytical services.

Table 62: Arrangements for using FDC services as ranked by factories within the sample.

Arrangements for using FDC services	Ranks by respondents			Total
	Rank 1	Rank 2	Rank 3	
Contract research commissioned by own company	59%	27%	14%	100%
Own research of FDC, government subsidized	27%	20%	52%	100%
Collective research commissioned with other food factories	25%	48%	26%	100%

Nearly 60% of potential FDC users prefer to use its services through a research contract commissioned by their own company (Table 62). A quarter of the respondents preferred collective research, commissioned by several companies together. However, the majority of the respondents ranked collective research second in their order of preference. Moreover, more than 50% of the respondents ranked government subsidized research third. Although private sector factories in general have a clearer bias against government subsidized research, (for reasons of confidentiality) smaller factories are less reluctant to get involved in government subsidized research[14].

[14] While 57% of private sector respondents ranked this type of contract third, only 41% of public sector respondent did so.

PART THREE
CONCLUSIONS AND RECOMMENDATIONS

The demand for services in the food industry is not homogenous.The results of our survey show that demand priorities vary according to several dimensions.The demand was shown to be often sensitive to the factory's type of ownership,production technology,its size and the recent changes in its production volume. Moreover,the product category of each factory influences its demand for services.

The majority of the respondents expected the FDC to meet their specific demands. Nevertheless,a number of respondents have expressed their view that expanding FDC services across the whole range of possible services would certainly affect service quality. In fact, meeting all different kinds of demands for services would require a huge physical and human investment in the FDC. Spreading FDC activities over this wide range of services would further magnify the burden of managing the FDC itself. Undoubtedly,the selection of a market segment to concentrate on has its benefits,but it also has its drawbacks. Currently the FDC is more inclined towards publicly owned large factories, and its clients are more concentrated in the canning and bottling sectors. This at least is how smaller and private factories operating in the food industry perceive the FDC. The self exclusion of these factories encloses FDC, originally meant to serve the food industry at large, in the market segment in which it started its operation. The FDC is changing this image through expanding its range of analytical facilities and establishing a pilot plant for research and development in areas which extend beyond the current perception of its activities.

I.The Primary Target Segment

Once the FDC has the capability to provide this wider range of services, it will still need a way to order and prioritize among these services internally. In a healthy organization such an internal ordering system should reflect the organization's market. If the market is considered to be the food industry in general, the FDC would have to reconcile different priorities within the same organization which, quite often, is a disabling task. We recommend that the FDC concentrate its activities on a market segment and prioritize its services accordingly. We also suggest this

segment to be factories using heterogenous production technology. Our survey has revealed that this is the most dynamic group within the industry. 80% of the factories belonging to this group are planning changes or improvements in technology, or production methods over the next two years. It is also the most dynamic group in terms of recent changes in production volume. The factories belonging to this group have witnessed either a decreasing or an increasing production volume during the last three years. Only a negligible percentage have had a stable production volume over the last three years.This group is suggested as the market segment the FDC should target since it is in a state of relative disequilibrium that makes it most receptive to change[15]. Another reason for selecting this group is their dynamic behaviour that should set the pace for the development of FDC activities, thus providing a hedge against organizational rigidity and stagnancy. The group of factories using heterogenous production technology cuts across the different product categories. It is more concentrated in larger factories. Factory size seems to encourage the accumulation of different levels of technology. Furthermore, this group is the least likely to have foreign agreements.

The suggested target segment is not uniform in terms of its on-premises analytical facilities. This will require a variety of approaches in the area of analytical services and research. We have already seen that interest in research rises where higher levels of analytical facilities exist. On the other hand,while the existence of on-premises analytical facility is a necessary condition for interest in analytical services ,this interest decreases with higher levels of self sufficiency in on-premises analytical facilities.

Finally, the group whose characteristics come closest to the suggested target group is that which includes factories using average production technology. These factories have also witnessed extreme changes in production volume in the recent past. A high percentage of them is also planning to introduce changes or improvements in the near future.

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[15] An alternative primary market segment could have been factories with decreasing production volume. These factories are even more receptive to change. It is the only group tha welcomes trouble shooting on product quality and production problems. It was however, preferred not to target these factories exclusively to avoid labelling FDC clients as failures.

II. Approaching the Target Segment

It is easier to target a group identified by a more observable characteristic such as ownership, product category, or even exporting status. A factory's production technology is not as recognizable as these characteristics. However, an approach could be devised for factories using heterogenous or average production technologies based on offering them activities that meet their interests as revealed by our study. The target group differs from other groups in having a consistently higher interest in production technology and methods as an information subject, in tackling production problems, and in the evaluation of manufacturing processes as areas of research. This group is also more interested in lectures on production technology given by FDC staff than other groups. Moreover, the factories using heterogenous technology have a higher interest in receiving advice on systematic quality control and in process research using FDC pilot plants. Given the consistent interest in subjects related to production technology, a high percentage of the participants in activities related to the subject would be self selected from our target group.

The choice of a target group with unclear boundaries would undoubtedly require an effort from the FDC to identify its clients. But those same unclear boundaries would have the advantage of preventing the formation of rigid perceptions as to whom FDC services are offered to, perceptions which have currently led to the self exclusion of potential clients.

III. Services Offered to the General Market

FDC concentration on a segment of the market will help develop a unique organizational experience for the Center. Increasing the rate of success in factories using heterogenous or average technologies in coping with the current changes through which they are going, would be a serious step towards meeting the ultimate objective of promoting the development of the Egyptian food industry.

However, the priority given to a market segment should not be taken to mean that services will be offered exclusively to it. Our suggestion is to offer integrated services for this segment feeding on each other to meet their demands and to face their problems. Nevertheless,this does not exclude other potential clients whose demands are compatible with those of our primary market. Several trends and patterns that could help design and

implement FDC services have been clarified by our study. These patterns apply to our suggested primary market, and to the food industry in general.

A. Training Services

The highest demand for training is for laboratory and research staff. This demand rises where higher levels of analytical facilities are available. The moderate level of satisfaction with analyses performed on-premises supports articulated demand for training laboratory staff. There is also a high demand for training technical staff and technically-oriented higher level staff independent of factory characteristics[16]. Moreover, the interest in training food technicians is higher in larger factories. Training seminars and formal courses held at the FDC on a regular basis for these groups would be well received by the food industry community. On the other hand, the FDC could train instructors and contribute to upgrading in-house or on the job training systems and capacities, for the benefit of process operators, production supervisors, as well as repair and maintenance technicians, all are seldom trained off-premises.

Generally, and this applies for any agent undertaking training activities, the FDC should exert its efforts to overcome the perception of training in Egypt as a paid vacation. Finally, a necessary condition for training effectiveness is to have it conducted in Arabic. Although this sounds obvious, a number of respondents seem to have had experiences where this condition has escaped the minds' of training organizers.

B. Information Services

The survey shows that the interest in information services rises with the level of analytical facility. It also indicates the scarcity of the sources of information serving the food industry. Moreover, private factories are seen to be more interested in issue-oriented information as compared to public factories whose interests are more generalized in informative seminars and lectures.

The information required by the factories within our sample is observed to

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[16] Although demand for training marketing and management is put in highest priority, we believe this type of training to be outside the current scope of the FDC.

be sensitive to their characteristics. As a result,it is difficult for a single agency to supply the market with information in the food industry. The subjects of conferences, seminars, and workshops will not hold the interest of more than a segment of the market. Following our recommendation for a primary target market, the FDC should concentrate on production technology, methods, problems and processes.

We recommend that the FDC, in addition to holding conferences and seminars, on these specific subjects plays, furthermore, the role of a catalyst or a facilitator as regards information services through a periodical publication[17]. This periodical, targeting the food industry at large, would be a vehicle for disseminating research papers, not necessarily written by FDC staff, through the various sectors within the food industry. It would also serve as an updated report on international research and developments related to products and their specifications, as well as news on advanced machinery, additives, and new products on the market. This periodical would also include the result of consultancy work within limits of confidentiality, and the tested solutions to problems that may be encountered in the industry. It could also be an update on world market tendencies and help establish contacts with parties abroad for technology transfer or export markets. Moreover, it should publicize local and international seminars and conferences.

This periodical will not only provide a good scientific basis for research in the food industry, but it will also establish multidimensional contacts among the FDC and the various components of the food industry. It would also be the ideal means to publicize FDC services on a large scale.

C. Research Services

The choice of heterogenous and average technology users as a primary FDC target implies that the FDC gives preference to research on issues ranked higher by these factories. This is mainly research on production technology and methods, the evaluation of manufacturing processes and approaches to production problems. Nevertheless, the FDC should also focus on other types of research. Packaging seems to be an issue that needs a lot of research and investigation. The study indicates that packaging has an undisputed importance all over the sample, irrespective of factory characteristics. We, therefore, recommend that the FDC includes packaging among its research

[17] This periodical was suggested by more than one of the respondents. Its suggested contents are also based on respondents' requirements.

priorities, given its importance to the food industry in general, and to exporters in particular.

Environmental research is another important topic for research which has only recently started to gain impetus in Egypt.The respondents were aware of the importance of this issue, especially those in larger factories. However, the implementation of environmental plans would necessitate financial backing and collective action. Both requirements are beyond the FDC domain and curtail its environmental plans. We therefore recommend that environmental research be accorded a high priority on the FDC agenda. However, the FDC should offer advice or devise plans on environmental issues only in conjunction with other agencies securing financial backing and promoting collective action.

It is obviously difficult for a single agency to research on each and every subject that interests its service users. The suggested FDC periodical publication could help activate research in areas that the FDC deems important, when the capacity or qualifications of its staff prevent its undertaking.

There seems to be a general reluctance towards consultancy jobs involving research on the clients' premises. This is especially true for an agency like the FDC with strong links with governmental institutions, and itself a part of the public sector structure-a fact which makes FDC confidentiality measures questionnable to a number of respondents. These respondents' doubts may be unfounded, but the FDC should, nonetheless, make a concerted effort to change this perception.

D. Analytical Services

The market for analytical services in Egypt could be expanded by introducing new analytical services that are not currently being performed in Egypt. It could also be expanded by inducing the substantial number of smaller, traditional factories that are now outside the market to use these services. However, the high percentage of factories that are not fully satisfied with analytical services as revealed by the study implies that, without expanding the market, there is wide room for providing better quality services.

The group most interested in analytical services are those factories with below average or average on-premises analytical facilities. Factories with no on-premisess facilities at all are usually not aware of the importance of carrying out such analyses. As for factories that have a higher level

facility, in most cases they are self sufficient and do not have much demand for this type of service.

An FDC program for upgrading both the technical and equipment standards of laboratory facilities in larger factories could increase these factories' self sufficiency as regards analyses that are regularly carried out. The frequent need for such analyses would justify the investment in equipment and training offered to these factories. On the other hand, this could free the FDC to perform analyses that are not as frequently needed by these factories, and would provide it with more time and space to serve smaller factories where laboratory investments would not be justified. For such a program, the FDC would need to work in conjunction with an agency that would provide a financial back-up for factories in need of upgrading their laboratory facilities[18].

IV. Quality of Service

The survey has pointed to a number of shortcomings in FDC services.If the FDC is to build a satisfied customer base, the following deficiencies should be rectified.

A. Price:

The majority of respondents found that FDC services are too expensive,especially if compared to fees charged by universities and institutes for providing the same service. On the other hand, an FDC information brochure claims that its services are being provided at actual cost, if not less. Both statements can be true, but this indicates that there could be a cost control problem at the FDC which should be studied and monitored.

B. Accessibility and Communications

Several respondents complained about the inconvenience of having to send samples for analysis to the FDC at its present location with analytical fees payable in advance. They also complained about having to make their

[18] A number of respondents have claimed that if they have the money, they would buy instruments like those in the FDC for their internal use.

payments at the bank then returning the receipt to the FDC. Dealing with the FDC seems to be a very time consuming process.

In order to overcome this problem, the FDC should have representative offices located in the various industrial cities all over Egypt. These offices would serve as stations where samples for analysis would be delivered and administrative as well as financial matters taken care of. These offices could also serve as contact points between the FDC and the private industry, carrying out field visits to factories in order to introduce the FDC to its market and to identify the needs and problems, of those factories. The FDC offices could lay the foundation for a smooth decentralization of a number of activities that will be needed in the future when the FDC market is considerably expanded. The periodical publication proposed earlier could also serve as an effective means of communication for the FDC.

C. Punctuality

A recurrent complaint by many respondents concerned time delays in relation to analysis that is being carried out at the FDC. One of the respondents wondered how an analysis that only takes 2 days to be completed at Tanta University, needs 10 days to be completed at the FDC. The numbers may heve been exaggerated but the question of why it takes the FDC longer than other service providers to carry out an analysis remains valid and its underlying reasons should be investigated and abolished.

D. FDC Staff Qualifications

The FDC and its staff should have "Service" at the top of their priorities. A well trained and self confident staff[19] is a precondition for providing good service. This should be followed by structuring staff rewards to include an assessment of customer satisfaction. Salaries should be raised so as to attract more highly qualified staff. The FDC staff should internalize the center's objective to promote the development of the Egyptian food industry. However, as we will see, the center itself does not always project an image consistent with its mission.

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[19] The issue of self confidence was raised by one of the respondents while discussing an incident that he recounted: "We sent some of our chemists to be trained there at the FDC, they had the impression that information was withheld by FDC. How could training be conducted with secrecy?"

V. FDC status

The respondents articulated their preference for dealing with an agency administered by an independent non governmental organization.The relationship of the FDC to the public sector causes respondents to be concerned about issues such as confidentiality, and bureaucratic procedures. In fact, one of the respondents said that "dealing with government agencies has a lot of problems and ends up to be very expensive", to justify that he will not consider using FDC services. However, the FDC mission to promote the development of the food industry in Egypt could hardly be assumed by a strictly private agency. This is especially true when one of the respondents expects the FDC "to comply with UNDP principles, especially that of being a non-profit organization". The same idea was reiterated in other words; "the center has a national duty to raise the level of the Egyptian food industry. It is not a profit making venture[20] .....".

However,a nongovernmental agency does not have to be a private one. The "Chamber of Food Industries" for instance, is a semi-public institution that could fit the respondents' aspired image of the FDC. We expect that changing FDC organizational status is not feasible. Therefore, we suggest that the FDC strengthen its links with the "Chamber" to project a balanced image for the food industry community.

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[20] ..... which is not consistent with requiring advance payments for their services", end of quote.

Appendix 1

THE FOOD DEVELOPMENT CENTER
(FDC)

Background

The Food Development Center (FDC) complex was established in Kaha city, Qaliubeya governorate by the Government of Egypt. Its further development is promoted in the framework of an international project in which the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO), and the Government of the Netherlands through the Netherlands Institute for Applied Scientific Research (TNO), cooperate. The FDC forms part of the the Food Industries Corporation (FIC), a public sector agency responsible for companies involved in the food industry. The FDC was established to promote the development of the Egyptian Food Industry, by helping the industry to improve the quality of food products, of packaging, and the efficiency of the production process. The FDC is designed to provide its services to both private and public sector companies in the food industry.

The FDC was originally concieved of as a public service institution, providing its services for free. Due to the increased costs of equipment, supplies and chemicals used in analysis, however, the FDC is now obliged to charge its clients a fee to cover operating expenses. This fee is set according to the cost of the tests required, and in some cases is even lower.

The FDC complex is made up of three different units occupying 3,400 square meters of land. The first unit comprises the administration offices and laboratories. The second unit contains the FDC's pilot plant, and the third unit is made up of the scientific library, a conference hall and a training center.

The FDC is currently being assisted by two UNDP/UNIDO projects to upgrade its technical facilities and know-how.

FDC Administration/Organization

The Chairman of the Board of Directors of the FDC is the Chairman of the Board of the Food Industries Corporation (public sector). The Board includes the Chairmen of various companies belonging to the Food

Industries Corporation (public sector); university professors in the Faculty of Agriculture (food industries division); and the heads of the technical, financial and administrative departments.

LABORATORY FACILITIES

The FDC contains several laboratories, for conducting various types of analyses:

Laboratories for Chromatographic analyses, containing equipment and machinery for Gas-chromatography, high-performance liquid chromatography, and thin-layer chromatography.

Laboratories for the analysis of fine and heavy elements. The equipment in this laboratory includes an atomic absorption spectophotometer, and a striptec system.

Laboratories for the chemical analysis of both finished products and raw materials used in the production process.

Microbiological laboratory for the analysis of both finished products and raw materials used in the production process.

A laboratory specifically designed for the analysis and testing of tinplate used in food industries, using the most technologically advanced testing equipment for testing the coating of metal, measuring and assessing the thickness and solidity of metal, as well as performing tests on the polishes used, their quality and level of adherence/cohesion.

A laboratory for measuring the levels of radioactive contamination of foodstuffs and raw materials used in the production process. The FDC is in the process of purchasing two new machines for this purpose.

Services Provided by the FDC

The FDC currently performs chemical, physical and microbiological analyses for quality control, tinplate and lacquer testing, and testing of

packaging materials. It will expand to provide quality control, technological research, training courses and seminars, product development, trouble shooting in food factories, in addition to information and advisory services. Within the next few years it will be providing sensory analysis, oils and fats processing, vegetable and fruit processing, bakery products, food preservation and food packaging.

Contributions made by the **Government of Egypt (GOE):**

1. The GOE supplied the land, building and staff for the FDC. The total investment up to 30/6/1987, including realestate, building materials and other expenses, is approximately LE 2 million.

2. The basic laboratory facilities were imported and installed, using the most modern methods, and the most qualified international companies, specialized in this field.

3. The GOE supplied the FDC with the necessary staff, and qualified engineers, trained on the most modern and sophisticated equipment.

Contributions made by **UNIDO**:

1. UNIDO imported all instruments and equipment for the laboratories and the pilot plant, as well as scientific texts for the FDC library.

2. The amount invested by the UNIDO, to date, has reached $ 1 million, in equipment and machinery.

Contributions made by the **Dutch Government** and the **UNDP** implemented by **TNO** (The Netherlands Organisation for Applied Scientific Research):

1. TNO organized training courses in Egypt and the Netherlands, in the different techniques and methods of analysis that the FDC will be performing,

2. TNC supplied the necessary experts and specialists in different fields, to conduct the training of FDC staff.

3. The UNDP has provided investments, when needed, to various companies

in the food industry.

4. The Dutch government has earmarked a grant worth $ 0.8 million to the FDC, to cover the costs of training, and missions by international experts.

Appendix 2

Arab Republic of Egypt:
FOOD DEVELOPMENT CENTER (FDC)

ENVIRONMENTAL QUALITY INTERNATIONAL (EQI)

UNITED NATIONS DEVELOPMENT PROGRAM (UNDP)

The Netherlands:
ORGANIZATION FOR APPLIED SCIENTIFIC RESEARCH (TNO)

ECONOMIC RESEARCH INSTITUTE FOR
SMALL AND MEDIUM SIZED BUSINESS (EIM)

INTRODUCTION

The Egyptian government is, with foreign assistance, establishing the FOOD DEVELOPMENT CENTER (FDC) to cater for the needs of the private and public companies in the Food-Industry. In order to guarantee that FDC maintains a good link with the industry and that its work & research programme responds to identified needs of firms in the industry, this survey is being carried out.

THE INFORMATION PROVIDED BY THE FIRMS WILL BE HELPFUL IN DEVELOPING THE FDC IN SUCH A WAY THAT THE NEEDS OF FACTORIES SUCH AS YOURS ARE SATISFIED. THE INFORMATION WILL ONLY BE USED FOR THIS END. INDIVIDUAL INFORMATION ON FIRMS WILL NOT BE USED. ONLY A REPORT WHICH DESCRIBES THE NEED OF THE SECTOR IN GENERAL TERMS WILL BE DRAFTED BY THE INDEPENDENT RESEARCH INSTITUTE EQI IN EGYPT AND THE EIM IN THE NETHERLANDS WHO GUARANTEE THAT NO INDIVIDUAL BUSINESS INFORMATION IS MADE AVAILABLE TO THIRD PARTIES (GOVERNMENT OR OTHERS). INDIVIDUAL-BUSINESS INFORMATION WILL BE DESTROYED UPON COMPLETION OF THE SURVEY.
WE WOULD BE OBLIGED IF YOU WOULD PARTICIPATE FOR THE BENEFIT OF THE INDUSTRY AND YOUR FIRM.

QUESTIONNAIRE CONTENTS:

PART I - About the factory

A. IDENTIFICATION
B. MAIN CHARACTERISTICS
C. PRODUCTION TECHNOLOGY AND FOOD ANALYSIS
D. LABOUR PROFILE
E. MATERIALS AND PACKAGING
F. EXPORTS
G. MAJOR PROBLEMS

PART II - About FDC

H. KNOWLEDGE OF FDC
I. IMAGE OF FDC
J. POSSIBLE SERVICES OF FDC
K. SUGGESTIONS FOR IMPROVING FDC

[ENTER STARTTIME, OTHER DETAILS AFTER INTERVIEW]
Date of interview..... Time, begin:...:... ...end: ...:... .....hours
Questionnaire: complete / incomplete
Reliability: low / average / good
Checked by: .....
Admissible: Yes / No / don't know
Remarks (if any):
.....

PART I - ABOUT THE FACTORY

Before dealing with FDC and the contribution it may have in developing the food industry in Egypt, we would like to have some information about your factory. (This information is needed to analyse and evaluate the options for FDC services: which services are in demand by which part of the industry?

A. IDENTIFICATION [WRITE DOWN IN CAPITALS PLEASE]

1. Name of company : .....
2. Address : .....
3. Town : .....
4. District : .....
5. Phone : .....
6. Name respondent : .....
7. Position .....

B. MAIN CHARACTERISTICS

8. Please describe the three main products: [FIRST CIRCLE THREE CODES, then GIVE RANKING: 1= MOST IMPORTANT, ... 3]

1. preserved fruit (canned or frozen) ...
2. preserved vegetables (,,) ...
3. fruit juices ...
4. jams/marmelades ...
5. edible oil & fats ...
6. soaps / detergents ...
7. biscuits and cakes
8. sweets, confectionary
9. chocolate (candy bars) ...
10. dairy products ...
11. meat products ...
12. fish products ...
13. water, beer, soft drinks ...
14. wines, distillery products ...
15. animal feed ...
16. other..... ...

9. Ownership of factory?
   1. government/State enterprise (FIC)
   2. private enterprise
   3. other: .....

10. Do you have any agreement with a foreign company?
   1 yes, joint venture
   2 yes, license agreement
   3 yes, acting as a subcontractor for a foreign company
   4 yes, other .....
   5 no

11. In which year has your factory started functioning?
   1. 19.... (approximately)
   2. don't know

12. Has your level of production (volume not prices) changed during the last three years?
   1. no
   2. yes, increased substantially
   3. yes, decreased substantially
   4. don't know

13. Do you know the reason for this change?

1. no
2. yes, specify.....

C. PRODUCTION TECHNOLOGY AND FOOD ANALYSIS

14. How would you describe the equipment [production technology] compared with your sector in Egypt, would you describe your equipment [production technology] for your main products as traditional, average or modern?

1. traditional
2. traditional/ average
3. average
4. average / modern
5. modern
6. heterogenous
7. don't know

15. Does the factory have any of the following?

1. R&D
2. laboratory work for quality control?
3. simple analysis
4. none [– Q 18]

16. [If Q15=YES] how many people are employed in this R&D/laboratory/analytical work?

..... [full time equivalents, technical staff only]

17. [If Q15=YES] Which types of analysis are carried out within factory? Please describe quality level.

[PROVIDE CARD, CIRCLE ONE ALTERNATIVE FOR EACH ROW]

codes: Levels of satisfaction:
1= high satisfaction
2= average
3= low satisfaction

1. chemical analysis, to determine:
   - 1.1 moisture..... 1/2/3
   - 1.2 fat..... 1/2/3
   - 1.3 protein..... 1/2/3
   - 1.4 fiber..... 1/2/3
   - 1.6 sugar..... 1/2/3
   - 1.7 other..... 1/2/3
2. physical analysis..... 1/2/3
3. micro-biological analysis..... 1/2/3
4. organoleptical analysis..... 1/2/3
5. R&D..... 1/2/3

18 - 19 Which types of analysis are carried out outside factory? **(PROVIDE CARD)**

18- Please describe organization supplying services: 19- Describe satisfaction level with these facilities:

Codes:
1= none
2= outside factory but within company
3= Egyptian Universities
4= at other food factories
5= FDC
6= other.....

Levels of Satisfaction
1= high satisfaction
2= average satisfaction
3= low satisfaction

1.	chemical analysis, to determine:		
	1.1 moisture	1/2/3/4/5/6	1/2/3
	1.2 fat	1/2/3/4/5/6	1/2/3
	1.3 protein	1/2/3/4/5/6	1/2/3
	1.4 fiber	1/2/3/4/5/6	1/2/3
	1.5 starch	1/2/3/4/5/6	1/2/3
	1.6 sugar	1/2/3/4/5/6	1/2/3
	1.7 other	1/2/3/4/5/6	1/2/3
2.	physical analysis	1/2/3/4/5/6	1/2/3
3.	micro-biological analysis	1/2/3/4/5/6	1/2/3
4.	organoleptical analysis	1/2/3/4/5/6	1/2/3
5.	R&D	1/2/3/4/5/6	1/2/3

20. Are any major changes/improvements in technology/production method, planned for the next two years?
    1. no
    2. yes

21. Did you receive any advice or information on technology/production methods/equipment/quality control/R&D during the last year?
    1. no [—Q 23]
    2. yes

22. If yes, from whom? (MORE ANSWERS POSSIBLE)
    1. from suppliers of equipment/materials/chemicals or packaging materials
    2. from customers (government trade agencies or private firms)
    3. from other, specify .....
    4. from other factory within same company, specify: in Egypt / abroad.

23. Do you need more information on these issues? [MORE ANSWERS POSSIBLE]
    1. no
    2. yes, on technology
    3. yes on production methods
    4. yes on equipment
    5. yes on quality control
    6. yes on R&D

D. LABOUR PROFILE

24. Number of permanent employees (staff & workers)
    .... number

25. Number of seasonal workers (maximum in a year at one moment)
    .... number

26. Do you find it difficult to hire new workers for replacement or expansion?
   1. no
   2. yes, skilled workers
   3. yes, unskilled workers
   4. yes, both
   5. don't know

27. Do you provide training for your employees? [MORE ANSWERS POSSIBLE]
   1. no
   2. yes, process operators
   3. yes, technical staff (machine and installation maintenance)
   4. yes, supervisors in production
   5. yes, R&D / laboratory staff
   6. yes, others.....

28. Do you need additional help in training your workers? [MORE ANSWERS POSSIBLE]
   1. no.
   2. yes for process operators
   3. yes for technical staff (machine & installation maintenance)
   4. yes for supervisors in production
   5. yes for R&D/Laboratory staff
   6. yes others .....

E. MATERIALS AND PACKAGING

29-33 Type of retail packaging [PROVIDE CARD - MORE ANSWERS POSSIBLE]

kind of packaging:	29. Are these types used.	30. [IF 29=YES] Any problems?	31. [IF Q30=YES] Describe type of problem 1= corrosion 2= mechan. strength 3= water&vapour trans 4= sealing 5= other.....	32. [IF Q30=YES] Describe where problem occurs 1= product itself 2= pack. process 3= in distribution 4= in consumption 5= in exporting 6= laws (e.g. health)	33. [IF Q30=YES] Of which material is this 'troublesome' packaging made? 1. glass 2. aluminum 3. tinned steel 4. plastic (PE/PP/PET/PVC/PVDC) 5. laminates 6. others.....
bottle/jars	no/ yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
cans	no/ yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
folding card-board box	no/yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
pouches	no/yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
flow packs	no/yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
cups	no/yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
others.....	no/yes	no/ yes	1/ 2/ 3/ 4/ 5	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6

34. Do you have problems with chemicals or additives used in process or product (e.g. quality control, specifications)
   1. none
   2. yes:.....

F. EXPORTS

35. Are (any part of) your products exported? [CIRCLE ALTERNATIVE]
    1. no [—Q36]
    2. yes
    3. don't know

36. [IF Q35=YES] What percentage of your total revenue is exported annually? [WRITE PERCENTAGE]

    Approximately: ... .%

37. [IF Q35=YES] Does export impose special problems? [MORE ANSWERS POSSIBLE]
    1. no
    2. yes, administrative/bureaucratic .....
    3. yes, marketing .....
    4. yes, product quality .....
    5. yes, packaging.....
    6. other

G MAJOR PROBLEMS

38-39. How important is each problem mentioned to your factory? **(PROVIDE CARD)**

	[Q38] IMPORTANCE 1= Major problem 2= Small problem 3= No problem 4= NA/ no answer	[Q 39] Rank three most important problems
Problems with:		
1. getting tools/equipment	1/2/3/4	.....
2. repair/maintenance of equipment	1/2/3/4	.....
3. getting raw materials	1/2/3/4	.....
4. quality of water supply.	1/2/3/4	.....
5. waste water/environmental problems	1/2/3/4	.....
6. hiring skilled labour	1/2/3/4	.....
7. technical know-how (production process)	1/2/3/4	.....
8. technical know-how (product analysis)	1/2/3/4	.....
9. quality of raw materials	1/2/3/4	.....
10. quality of final products	1/2/3/4	.....
11. packaging	1/2/3/4	.....
Others, please specify:		
12.	1/2/3/4	.....
13.	1/2/3/4	.....
14.	1/2/3/4	.....

PART II - FDC

In this part of the interview we will discuss the services which are or might be rendered by FDC. It may not be possible for FDC to offer several of the services discussed here in the short term, the information and opinions collected here, however, will be a valuable and productive contribution to upgrade FDC with the aim to improve the practical support to firms in the food industry.

H. KNOWLEDGE OF FDC

40. Did you - prior to this interview - know about the FDC? [CIRCLE ALTERNATIVE]
    1. yes [—Q41]
    2. no [—Q44]

41. [IF Q40=YES] How did you first get to know about FDC? [CIRCLE ONE ALTERNATIVE if 3-5: SPECIFY]
    1. don't know.
    2. information from colleague/other entrepreneur
    3. read about it in:.....
    4. information from government official, department: .....
    5. other .....

42. [IF Q40=YES] Did this factory ever use the services of the FDC? [CIRCLE ALTERNATIVE if 2: WRITE YEAR]
    1. no [—Q44]
    2. yes, since 19.. [—Q43]

I. IMAGE OF FDC

43. [IF Q42=Yes] Please give your opinion on the following statements: **(PROVIDE CARD)**

1= agree
2= indifferent
3= do not agree
4= don't know

1. FDC has adequate facilities to assist my business	1/2/3/4
2. FDC staff are well trained 'food specialists'	1/2/3/4
3. FDC is responding accurately to my problems	1/2/3/4
4. Facilities of FDC are too expensive	1/2/3/4
5. Quality of FDC services will increase soon	1/2/3/4
6. Operating my business is easier by using FDC	1/2/3/4
7. FDC attitude is much too bureaucratic	1/2/3/4
8. FDC provides adequate support and advice	1/2/3/4
9. FDC gives little attention to my problems and jobs	1/2/3/4

J. POSSIBLE SERVICES OF FDC.

In this section (J) services possibly rendered by an upgraded FDC are considered.

44-45. How important is this service to your factory? **(PROVIDE CARD)**

Possible service	[Q 44] IMPORTANCE 1= Major service 2= Some use 3= Of no use to us 4= N.A. / No answer	[Q 45] What are the top three services on the list?
I. Quality control raw materials and finished and intermediate products:		
1. chemical analysis	1/2/3/4	_____
2. microbiological analysis	1/2/3/4	_____
3. physical analysis	1/2/3/4	_____
4. organoleptical analysis	1/2/3/4	_____
II. Packaging materials:		
5. quality control/testing	1/2/3/4	_____
6. functionality, suitability for specific packaging in relation to product quality.	1/2/3/4	_____
III. Trouble shooting in food factories:		
7. hygienic problems	1/2/3/4	_____
8. product quality	1/2/3/4	_____
9. process evaluation	1/2/3/4	_____
10. technical problems	1/2/3/4	_____
IV. Product development (pilot plant):		
11. suitability types of raw materials for industry	1/2/3/4	_____
12. effect of additives on product characteristics	1/2/3/4	_____
13. effect of process parameters on product quality; efficiency of process;	1/2/3/4	_____
14. process research.	1/2/3/4	_____
V. Information services:		
15. literature research and dissemination	1/2/3/4	_____
16. seminars and conferences.	1/2/3/4	_____
VI. Training services/courses for:		
17. plant operators	1/2/3/4	_____
18. laboratory/research personnel	1/2/3/4	_____
VII. Advice to industry on:		
19. process analysis	1/2/3/4	_____
20. modification in process	1/2/3/4	_____
21. systematic quality control	1/2/3/4	_____
22. equipment selection	1/2/3/4	_____
23. design of lay-out	1/2/3/4	_____
24. engineering	1/2/3/4	_____
25. waste water or other pollution problems	1/2/3/4	_____

46. If you had £E.100.000 available for FDC services, how would you spend your money on FDC-services?
(PROVIDE CARD)

1.	quality control raw materials and products	£E .....
2.	research on packaging material	£E .....
3.	trouble shooting in food factories	£E .....
4.	product development (using FDC pilot plant)	£E .....
5.	information services	£E .....
6.	training services/courses for	£E .....
7.	advice to industry	£E .....
	TOTAL	LE 100.00

47. How much do you now spend for these services as a total? (WRITE APPROXIMATE AMOUNT IN L.E.)
LE .....

48. In which way would you prefer using services of FDC?
- contract research commissioned by own company rank .....
- own research of FDC, government subsidized rank .....
- collective research commissioned by you with some other food factories rank .....

49. Which are the major three problems you do foresee in using FDC facilities? (THESE CHOICES SHOULD NOT BE READ)
1. bureaucracy
2. prices
3. quality
4. staff know- how
5. confidentiality of information
6. other.....

K. SUGGESTIONS FOR IMPROVING FDC

50. Which are the major three suggestions you have to improve the contribution of FDC to your business.
[PLEASE WRITE IN CAPITALS]
1. .....
2. .....
3. .....

51. Would you seek advice of FDC about prevention of environmental problems?
1. no
2. yes

52. What type of research would your factory be interested in? (PROVIDE CARD)

1= very intersted
2= somewhat interested
3= not interested
4= don't know

1. how problems in production should be tackled	1/2/3/4

2. how food items popular in world market should be produced/copied	1/2/3/4
3. quality evaluation of chemicals bought (incl. additives)	1/2/3 4
4. quality evaluation of packaging	1/2/3/4
5. evaluation of manufacturing process (samples)	1/2/3/4
6. how to tackle environmental problems (waste etc.)	1/2/3/4

53. Which other research would be of interest to your firm (not given in Q53): [NOT MORE THAN THREE ANSWERS]
.....
.....

54. What type of training would be of interest to your factory? (PROVIDE CARD - CIRCLE ALTERNATIVE FOR EACH ITEM)

1= very interested
2= somewhat interested
3= not interested
4= don't know

1. machine operators	1/2/3/4
2. process operators	1 2/3/4
3. maintenance of machinery	1/2/3/4
4. medium level staff (food technicians)	1/2/3/4
5. higher level staff (technical oriented)	1/2/3/4
6. higher level staff (management, marketing, exports)	1/2/3/4

55. Which other training would be of interest to your factory (not given in Q55): [WRITE IN CAPITALS]
.....
.....

56. Would you be interested to participate in these activities if organised by FDC?
[PROVIDE CARD-CIRCLE ALTERNATIVE FOR EACH ROW]

1= very interested
2= somewhat interested
3= not interested
4= don't know

1. demonstration of chemical products by manufacturers	1/2/3/4
2. lecture by FDC-staff about production technologies	1/2/3/4
3. lecture by foreign specialist about developments in international food markets (varieties/marketing)	1/2/3/4
4. lecture by foreign specialist about developments in food technology	1/2/3/4
5. demonstration of machinery by manufacturers	1/2/3/4
6. demonstration of FDC testing facilities (chemical and physical available to industry	1/2/3/4
7. lecture about training facilities at FDC	1/2/3/4
8. lecture by FDC-staff about use of chemicals	1/2/3/4
9. lecture about quality testing of inputs and products	1/2/3/4

57. Would you, after having learned about the possible services of FDC, need to better informed about it?
1. no, information is sufficient
2. yes, it would facilitate the use of FDC services

58. Would you now consider to make use of FDC services:
1. no [—Q59] [CIRCLE ALTERNATIVE]
2. yes [—Q60]
3. don't know [—END]

59. [IF Q58=NO] What would be the reason for NOT using FDC services? **[DO NOT READ RESPONSES]**

1. own facilities are sufficient.
2. we have other sources for assistance and information: .....
3. such a - government related - institute will not be useful
4. distance
5. other:.....

60. [IF Q58=YES] What would be the reason for using FDC services? **[DO NOT READ RESPONSES]**
[MORE ANSWERS POSSIBLE]

1. to acquire more knowledge/information
2. our own capacity is not sufficient in busy times
3. for certain operations we don't have the equipment
4. for certain operations we lack skilled workers or knowledge
5. to have independent results/opinions
6. other .....(END)

*** THANK YOU VERY MUCH FOR YOUR COOPERATION ***

RESPONDENT CARDS
(Card A)
PRODUCTION TECHNOLOGY & FOOD ANALYSIS

17. Which types of analysis are carried out within your factory? Please describe quality level.

codes:

Leves of satisfaction:
1= high satisfaction
2= average
3= low satisfaction

1. chemical analysis, to determine:
   - 1.1 moisture.....1/2/3
   - 1.2 fat.....1/2/3
   - 1.3 protein.....1/2/3
   - 1.4 fiber.....1/2/3
   - 1.6 sugar.....1/2/3
   - 1.7 other.....1/2/3
2. physical analysis.....1/2/3
3. micro-biological analysis.....1/2/3
4. organoleptical analysis.....1/2/3
5. R&D.....1/2/3

18 - 19 Which types of analysis are carried out outside your factory?

18- Please describe organization supplying services:
Codes:
1= none
2= outside factory but within company
3= Egyptian Universities
4= at other food factories
5= FDC
6= other.....

19- Describe satisfaction level with these
Codes:

1= high satisfaction
2= average satisfaction
3= low satisfaction

1. chemical analysis, to determine:		
1.1 moisture	1/2/3/4/5/6	1/2/3
1.2 fat	1/2/3/4/5/6	1/2/3
1.3 protein	1/2/3/4/5/6	1/2/3
1.4 fiber	1/2/3/4/5/6	1/2/3
1.5 starch	1/2/3/4/5/6	1/2/3
1.6 sugar	1/2/3/4/5/6	1/2/3
1.7 other	1/2/3/4/5/6	1/2/3
2. physical analysis	1/2/3/4/5/6	1/2/3
3. micro-biological analysis	1/2/3/4/5/6	1/2/3
4 organoleptical analysis	1/2/3/4/5/6	1/2/3
5. R&D	1/2/3/4/5/6	1/2/3

(Card B)

MATERIALS AND PACKAGING

29-32 Type of retail packaging [PROVIDE CARD - MORE ANSWERS POSSIBLE]

Kind of packaging:	29. Are these types used.	30. [IF 29=YES] Any problems?	31. [IF Q30=YES] Describe type of problem 1=corrosion 2=mechan. strength 3=water& vapour trans 4=sealing 5=other.....	32. [IF Q30=YES] Describe where problem occurs 1=product itself 2=pack. process 3=in distrib. 4=in consump. 5=in export 6=laws (e.g.health)	33. [IF Q30=YES] Of which material is this 'troublesome' packaging made? 1. glass 2. aluminium 3. Tinned steel 4. plastic (PE/PP/PET/PVC/ PVDC) 5. laminates 6. Other.....
bottles/jars	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
cans	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
folding card-board box	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
pouches	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
flow packs	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
cups	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6
others.....	no/yes	no/yes	1/ 2/ 3/ 4/ 5/	1/ 2/ 3/ 4/ 5/ 6	1/ 2/ 3/ 4/ 5/ 6

(Card C)

MAJOR PROBLEMS

38- 39. How important is each problem mentioned to your factory?

[Q38] IMPORTANCE

1= Major problem
2= Small problem
3= No problem
4= NA/ no answer

[Q 39] Rank three most important problems

Problems with:

1. getting tools/equipment	1/2/3/4	.....
2. repair/maintenance of equipment	1/2/3/4	.....
3. getting raw materials	1/2/3/4	.....
4. quality of water supply.	1/2/3/4	.....
5. waste water/environmental problems	1/2/3/4	.....
6. hiring skilled labour	1/2/3/4	.....
7. technical know-how (production process)	1/2/3/4	.....
8. technical know-how (product analysis)	1/2/3/4	.....
9. quality of raw materials	1/2/3/4	.....
10. quality of final products	1/2/3/4	.....
11. packaging	1/2/3/4	.....
Others, please specify:		
12.	1/2/3/4	.....
13.	1/2/3/4	.....
14.	1/2/3/4	.....

(Card D)
IMAGE OF FDC

43. Please give your opinion on the following statements:

1= agree
2= indifferent
3 = do not agree
4= don't know

1. FDC has adequate facilities to assist my business	1/2/3/4
2. FDC staff are well trained 'food specialists'	1/2/3/4
3. FDC is responding accurately to my problems	1/2/3/4
4. Facilities of FDC are too expensive	1/2/3/4
5. Quality of FDC services will increase soon	1/2/3/4
6. Operating my business is easier by using FDC	1/2/3/4
7. FDC attitude is much too bureaucratic	1/2/3/4
8. FDC provides adequate support and advice	1/2/3/4
9. FDC gives little attention to my problems and jobs	1/2/3/4

(Card F)

46. If you had £E. 100.000 available for FDC services, how would you spend your money on FDC-services?

1.	quality control raw materials and products	£E .....
2.	research on packaging material	£E .....
3.	trouble shooting in food factories	£E .....
4.	product development (using FDC pilot plant)	£E .....
5.	information services	£E .....
6.	training services/courses for	£E .....
7.	advice to industry	£E .....
		LE 100.00

(Card G)
SUGGESTIONS FOR IMPROVING FDC

52. What type of research would your factory be interested in?

1= very interested
2= somewhat interested
3= not interested
4= don't know

1. how problems in production should be tackled	1/2/3/4
2. how food items popular in world market should be produced/copied	1/2/3/4
3. quality test of chemicals bought (raw materials and additives)	1/2/3/4
4. quality tests of packaging	1/2/3/4
5. quality tests of manufacturing process (samples)	1/2/3/4
6. how to tackle environmental problems (waste etc.)	1/2/3/4

54. What type of training would be of interest to your factory?

1= very interested
2= somewhat interested
3= not interested
4= don't know

1. machine operators	1/2/3/4
2. process operators	1/2/3/4
3. maintenance of machinery	1/2/3/4
4. medium level staff (food technicians)	1/2/3/4
5. higher level staff (technical oriented)	1/2/3/4
6. higher level staff (management, marketing, exports)	1/2/3/4

56. Would you be interested to participate in these activities if organised by FDC?

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1. demonstration of chemical products by manufacturers	1/2/3/4
2. lecture by FDC-staff about production technologies	1/2/3/4
3. lecture by foreign specialist about developments in international food markets (varieties/marketing)	1/2/3/4
4. lecture by foreign specialist about developments in food technology	1/2/3/4
5. demonstration of machinery by manufacturers	1/2/3/4
6. demonstration of FDC testing facilities (chemical and physical) available to industry	1/2/3/4
7. lecture about training facilities at FDC	1/2/3/4
8. lecture by FDC-staff about use of chemicals	1/2/3/4
9. lecture about quality testing of inputs and products	1/2/3/4

END OF CARDS

Appendix 3

List of Sources

Food Industries Direcory	Chamber of Food Industries,	1985
Egypt Commercial Directory	1st Edition,	1987
The Economic Directory		1985 -1987
Egypt Investment and Business directory		1987 - 1988
Voedselverwerking & Verpakking in Egypte		1986

Appendix 4

Production Technology/Production Process

The term "Traditional" is applied to a relatively labor intensive production process that involves manual labor at a variety of levels. There is much handwork in the preparation of raw materials, in the packaging of the final product, and in internal transport (i.e. hand-pushed trolleys). The factory operates with old machinery, controlled manually at the machine. Traditional production technology is also distinguished by relatively small-scale batch processes, and traditional packages and packaging materials.

The term "Average" is applied to a production process which involves little handwork. The preparation of raw materials (cleaning, grading, washing and cutting) is completed by machines. Packaging is by intermediate speed packaging machines, involving less labor. Internal transport is mechanical, and, as far as possible, continuous. Average production technology is also distinguished by batch and semi-continuous processes, with control from a distance (not by the machine, as in Traditional). Packages are both traditional and modern.

The term "Heterogeneous" is applied to a production process that contains, within the same production line, technology (equipment) that is traditional, average and modern. Processes are both automated and manual. While "Average" production technology lies between "Modern" and "Traditional", Heterogeneous contains elements of all three.

The term "Modern" is applied to a production process with automated, integrated, high speed production lines and packaging machines. There is an emphasis on new tyes of packaging. Worker intereference is limited to supervision and problem solving. Modern production technology is distinguished by versatility, high out-put per laborer, and a high capital investment per unit of production capacity.

Analytical Facilites

"Simple Analytical Facilities" refers to the presence of simple testing equipment (e.g. moisture balance, refractive index meter, control set for boiler feed water, etc.). There is no special area or room set aside for this equipment, and there is no specific trained laboratory personnel.

"Laboratory" refers to a room within the factory that contains working benches, analytical equipment, chemicals, and a permanent staff of at

least one person trained in and fully occupied with quality tests on raw materials, final products, packaging materials, etc.

Research and Development (R&D) refers to the presence in the factory of a structured programme directed at, for example, the development of new products, improvements in the process (efficiency, product losses), solving basic problems (e.g. keepability in relation to packaging) through systematic research. It is more active than quality control through a laboratory.