

A PROPOSAL OF MANAGEMENT STRUCTURE AND RESOURCES DISTRIBUTION MODELS TO DESCRIBE THE TECHNOLOGICAL DISTRICT OF GENOVA – DIXET–

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ABSTRACT (English version)

The Technological District of Geneva (Dixet) pre analysis focus on 2 problems; describe the management structure type of the district and the distribution of financial resources. The first question rise from the definition of "Consiglio Direttivo" in the articles of Dixet. The questions are obvious: it ("Consiglio Direttivo") only represents all the district companies or somehow manage the district? If it acts as management how is the structure and responsibility?

The results show the "Consiglio Direttivo" structure is close the hierachy management model with Genova High Tech spa as "staff" structure, dedicate a well defined activities. There are few weak points in this structure applied in Dixet; the SME are not sufficient protect against social and economical market, the number of representative member of SME is not well balanced against big companies. The second question regards the optimization of resources distribution; the lack of public reliable data, makes hard to achieve an optimum real solution. Hence distribution question is faced¹ from a different point of view; the management structure is the basis to distribute the research funding and if there is a lack of information on flow, we made assumption taking into account the percentage SME size distribution or relevant activity sector.

ABSTRACT (Italian version)

La pre analisi del distretto tecnologico di Genova (Dixet) si focalizza su 2 problemi; la descrizione dell' assetto organizzativo e la distribuzione delle risorse. La prima questione nasce dalla descrizione dell'assetto organizzativo del Dixet, esposta nello statuto del distretto stesso. Le domande sono ovvie: esso (Consiglio Direttivo) rappresenta solo le aziende del consorzio o in qualche modo gestisce il distretto? I risultati della analisi avvicinano più il "Consiglio Direttivo" ad una struttura gerarchica con la società Genova High Tech Spa come struttura di "Staff", con compiti precisi. Sono presenti alcuni punti deboli; le pmi non sono sufficientemente protette nei confronti del mercato socio economico, e i membri rappresentanti nel Consiglio Direttivo sono proporzionati a favore delle grandi industrie.

La seconda problematica è l'ottimizzazione della distribuzione delle risorse; la mancanza di dati pubblici affidabili rende difficile tale ottimizzazione. Quindi si affronta la questione da un differente punto di vista; l'assetto organizzativo è la base per distribuire dei fondi per ricerca e se mancano informazioni sul flusso, facciamo assunzioni considerando la distribuzione delle aziende come dimensione o per settori produttivi rilevanti.

INTRODUCTION

Thinking to the Italian Industrial District we have the "classical" idea of products made, gold in Valenza district, wool in the District of Biella and so on. The Technological District of Genoa (Dixet), demonstrates how different the situation can be. Starting from analysis driven protocol in the appendix, we find out the correlation matrix of Dixet, about Resource distribution problem, Management structure type problem and social-economical interaction problem. The idea to develop in the report is first explain the Management Structure(M.S.) of Dixet, and assuming the M.S. as basis discuss the case "how to distribute financial research funding" inside the district in the best way.

CORRELATION MATRIX

OPERATIONAL STRUCTURE

S.O Tech.Parameter	Spatial Allocation SME (it's a common note of all parameter; the result depends on sector activities considered)	Job distribution between SME	Logistics = physical flows net	Max production rate of single SME
S.O Performance Indicators				

¹ To Face = Affrontare

Concentration production degree	Up to sector: Aerospace and Biomed is HIGH, see Piaggio spa and ESAOTE. All other has MEDIUM.	HIGH=AEROSPACE, BIOMED (Piaggio mainly assemble all the parts). LOW=INFOTECH (most SME make the entire product). Unknown the Other	Infotech no applicable it relies on how the internet infrastructure is. Aerospace and the OTHER sector unknown.	Only one SME gives that data;
Human resources available in single sme(if possible the level of skill)	High level skill in well defined areas; University level except for Special Work sector. The last one can have craftsman(Artigiani)	High concentration in each sector, also Special Work; the worker has an high manual skills.	High presents of different links to reach work area. "equally far" from airport, railways, highways and naval port.	
Means of trasportation	Infotech has no means of transportation all product are transfer by internet network. Aerospace and Biomed are few , the product unit are low; but are to be treat carefully. The Other ones sectors is unknown the information.	About Infotech we apply different schema how the intranet is made, info not available. Other sector not known.	Not available for any sector	

MANAGEMENT STRUCTURE

A.O. ² Param. Tech.	Responsibility assigned to single SME.	Information Pattern available each SME	Type of internal agreement and control process	Type of external agreement between Dixet and not Dixet members.
A.O. Perf. Indicators				
Type of Management Structure.	High responsibility to the 7 leader companies having 5 member in "Comitato".	High complex for Aerospace and Biomed, low complexity for Other ones considering most SME are less than 50 worker.	Rappresentative Council? Some data notes it acts also as "management". To be further analysed.	Agreement with RINA Quality certification authority to promote the quality system production in all DIXET SME. InfoTech Security agreement all Dixet SME has to reach a minimum level security in InfoTech.
Type of Coordinator group (If Any exists)	Election vote		High coordination at political level, but unknown from management point of view, especially how to consider the "delibere" guidelines or a rules/laws.	Guidelines in directing funding and liabilities to research or recover dismissed industrial areas.
Type of coordination method	"not balanced" 5 member of big SME and 5 member of PMI SME in "Co nsiglio".	Up to "Comitato direttivo", e.g high if there is an high number of extra meetings. Actually unknown the secretariat activities in this sense.		Delibera del comitato as guidelines towards external groups or companies.

SOCIAL AND ECONOMICAL INTERACTIONS

ICSE Tech Parameter	Commercial agreement with client or supplier.	Production strategy type.	Job cost and law of job market
ICSE Performance Indicators			
Percentage product covering.	Aerospace Low cover, Biomed HIGH 90% national market the Other follow the market laws (domanda-offerta)	Aerospace spread in many years typical 10 years. The life cycle of aircraft is 20 years and after 10 year there is the middle life upgrade and at this point the macro production strategies can be changed. Other sector are unknown	Big SME has a strong bond to class worker contract (CCNL Metalmeccanici) The companies below 16 persons has no protection rules on contract worker – companies see art 18 italian laws. Possible define new contratti categoria for the sector with social safety rules.
Percentage worker based on residential people..	The aerospace and Biomed strong tie, as there is a project spreading many years. Weak tie and following the market for other sector.		

THE MANAGEMENT STRUCTURE

The following table I shows how the district companies are distributed in each activities sector. A first look find out that not all sector have a pyramidal hierarchy structure and few sectors (e.g. Aerospace) have few or no category size (medium for aerospace) members of Dixet. We focus on Aerospace and Biomed sector, but similar considerations can be made for the other ones. The lack of medium size companies in aerospace (see tabella 1) can be treat as discrete evolution of sector, and the data notes medium size companies are "destroyed" by local market laws. So every decision to improve or install this medium size companies rely on the political efforts as an exponential growth of production of a small size to skip mid size category is not real. For small size firm the discussion is similar, but we have to add the lack of safety protection rules on workers, so a firm can born and die without a

² A.O. Italian abbreviation of Management Structure used not to confuse with Microsoft code.

rumors. The problem rise when more than one small firm die which is the impact on society and what is the “critical mass” (the number of companies that die simultaneously) to say: “ we have social crisis”.

	TLC	INFOTECH	ELETRONICA	ROBOT & AUTOMATION	BIOMEDICALE	AEROSPACE	OTHER TECH ³	TOTALE
Grandi Aziende (oltre 200 addetti)	2 Marconi mobile Marconi Com.	2 Datasiel, Postel	0	1 Siemens Orsi Automation	1 ESAOTE Spa	1 Piaggio Aero Industries	0	7
Medie Aziende (51-200 addetti)	1 Cubecom spa	1	3	0	0	0	0	5
PMI (0-50 addetti)	4	50	24	6 ⁴	5 ⁵	1 Bonetti aircraft	13	103
TOTALE	7	53	27	7	6	2	13	115
percentuale ⁶	5,98 %	46,08 %	24,47 %	5,98 %	5,21 %	1,73 %	11,30 %	

Tabella I Companies distribution in each activity sector

As defined in articles of Dixet the association has not financial aims, so every kind of management is delegated to another structure. In the nr 2 mission aims the recovering of dismissed area, the members of Dixet found an Society Actions(spa) which has the task to manage a specific task; this is the cases of Genoa High Tech Spa which care to recover the Colle degli Erzelli area as new Dixet companies infrastructure. The second aim of Colle degli Erzelli area is to concentrate all InfoTech labs and companies in a location well linked to all type of transportation and easy to reach from any client. Each Dixet sector , as previous said, has a pyramidal structure, and the whole management structure can be compared to multi- hierarchy model in the negotiation theory. Each pyramid can be divided in 3 level; big companies, medium size firms and small industries. During a negotiation an industry of a level treats with another firm of the same level; a second disposal on the final negotiation come from top to down of pyramid. One of major characteristics is that aerospace sector has most companies of level medium and small outside the Dixet; to distribute the funding this sector has to be penalised, it flush out money, but the penalty can be so high because the companies outside Dixet let the aerospace sector exists. An improvement of Consiglio Direttivo is the reallocation of candidate reservation; as over than 70% member are small size firm and the representative member can be divided in this way; 3 deputy elected by big size firm, 2 deputy by medium size companies and the last 5 deputy by small size. The subdivision take into account also that big companies makes 25% annual earning of district and are leader companies in each sector, and every decision in the worst case should have 3 big firm deputy, the president, and 2 other deputy(or 1 medium size and 1 small size or 2 small size company deputy). The contrast way to decide (the SME deputy always in opposition to big size) lead to district destruction, while cooperation can lead an improvement in each sector taking into account to small size.

At this point the reader wants some data to think on, but now rise a third question-problem: there is a lack of public data available (problem), and the data can be better made available to the public. eg: publish on Dixet web site the leader company annual budget(question). Only 2 companies(Esaote and Siemens) on 115 have published their annual balance, another one (Piaggio) has only the annual earn before taxes. It's is impossible to find a maximum (medium) production rate or market covering of single SME. Also the customer supplier relationship are unkown; how is the amount of the production flow that each SME exchange with another Dixet SME and the amount with external companies. The siemens balance regards all siemens group and it is not possible to know the Orsi quota. Other unsolved question are how is the distribution amount of annual earning of Dixet of 1000 millions euro? The data exchanged between the Dixet network how is the type; only emails, CAD design integrated, schedule integrated, only website news or anything else? The financial amount dedicated to research come only from European project or there are some private funding? To know this information can change the management structure in division type if design is integrated, or we can identify more companies other than Genoa High Tech as staff or if all Dixet rely on European project for research, if true is a weak point of the district. The research funding are distributed directly or the leader companies take the money and then distribute as necessary. At moment no way out was found to have useful data, also asking this data directly to Dixet, so the previous question remain unanswered.

THE RESOURCES ALLOCATION

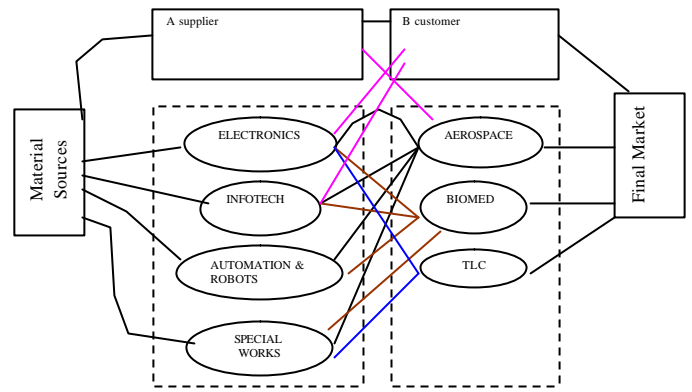
³ MATERIALI, LAVORAZ. SPECIALI, ELETTRMECC

⁴ Company has 2 production sector is counted only in one sector.

⁵ Company has 2 production sector Biomed and infotech is counted only in one sector activities.

⁶ Area coverage (nr comany of the sector over the total nr companies of Dixet)

The major characteristics of Dixet are, as previous said: involved in high technologies and the companies members are small size and concentrated. Inside Dixet are present very different kind of Products and services activities; Aerospace, Biomedical, Telecommunications, Microelectronics, Automation and Robotics, Other Work (mainly special works on materials). A more deep analysis notes that microelectronics, robotics, InfoTech and OW forms a group A, linked to the Aerospace, Biomedical and TLC sectors which we call group B. The pyramidal structure is made by a base, in which are present one or more firm group A of InfoTech, Robots, etc sector and a vertex composed by one leader company of the sector (e.g: Piaggio aero industries for aerospace). The few data and info collected notes that the mathematical condition are not satisfied(Equazione 1). The a_i represents the capital invested or product equivalent of group A companies and similar for b_j .



The previous equation is a strong bond, all material, money flows are internal and only group B companies can operate directly with the markets. The real situation is still different, especially for microelectronic, part of its flows are also directly to market and for group B not all resources are taken from group A companies, the Piaggio Aero industries suppliers for aluminium wing panel or wheel tyres are not part of district. To apply the bipartito grafo solution model we have to introduce two “virtual companies” ; The $A_{supplier}$ represent the amount of physical flow (money or Product) that group B companies buy from external companies Dixet, this can be viewed as a condition to feed the local market and protect the local SME (not only Dixet member).

The $B_{customer}$ is the physical flow that group A companies has directly with final market, and it can be qualified as second condition to protect SME and to grant the survival of District. Unfortunately the data available are not sufficient to identify the amount of flow and type(money or product). Note in Eq:1 the 2 range limit of the storages; they can be or not present, it’s up to how the district management rules. The range limits are rules both on minimum or maximum store capacity, and can assumed as existence condition of district. The link A supplier to B customer directly exist and it can be assumed product market without Dixet coverage.

We focus on 2 possible example of financial liabilities distribution: first case regards scientific research the second is technological knowledge transfer. Assuming the management structure as basis, in the first case is better to divide the funding equally only to lead companies of each sector, so they can trace guideline research activities for long term and they can rely on their own infrastructure to distribute to medium and small size firm funding and research job activities. For aerospace there is a penalty⁷ that part of its small and medium companies are outside the district. This would encourage Piaggio make the its own small firms enter in the district. This penalty has to be decided by district members in the normal or extra meeting, and one possible basis rules may be the ratio of small companies inside district over the total number of companies present in the area related to one sector (eg: aerospace) if the result is over 10% can be reduced by the percentage of worker of the district company in that sector over the worker present in the employed in the sector. If piaggio employees all the aerospace worker in the area it is not so penalized.

The second case the technological transfer the rule to distribute funding has to improve small size firm, mainly for two fact:

1. the lead company are all assembly company and rely about technologies on how are the “skill” of small ompanies and
2. usually small companies has no sufficient funding to invest in upgrade.

The fundings have to be distributed to small companies following the percentage sector of tabella I, so all the major companies can have the latest technologies available on which rely on. This rule can be improved by reducing the percentage on considering the number of worker of that sector over the total present. This reduction is to be direct to professional upgrade training courses for unemployed worker of the sector. In this way can have a protection of knowledge capital that can be converted or upgrade for future use. (It follows the percentage row of tabella I). The cell in grey is an example, the aerospace sector has to reduce the 5,21% of funding to technological transfer by 10,19% that will be used for training. If the starting funding is 100 milions euro; small companies receive 5,21 milions euro for technological transfer and of this liabilities about 530’899 euro will be used for training all worker of sector also the ones employed by big companies.

	TLC	ELETTRONICS	ROBOT & AUTOMATION	BIOMED	AEROSPACE	OTHER TECH ⁸	TOTAL
% companies = % funding tech research	5,98 %	46,08 %	24,47 %	5,98 %	5,21 %	1,73 %	100%
Percentage worker sector over the worker of district					1200/7500 = 0.16		
Total percentage funding					5,21-16= Abs(10,19%)		

⁷ The amount of the penalty is to be decided by “delibera” of “comitato direttivo” basis on the proposal of members, and it has to be link on the percentage of volume of companies inside or outside district over the total amount of firm in the area.

This 2 cases of funding distribution are not the best one, but the only possible with the data in available . These solution can be better find in an engineering way of grafo bipartito also including the the protection rules for small companies or for worker. The exact knowledge of the district status is unknown also by the member, as in the Web pages of the dixet appeared in December 2005 show. The article said the commercial chamber of genoa with othe commercial chamber of savona, imperia, la spezia, started a study of commercial flow between local industries and foreign companies . The commercial chamber of genoa is one of the dixet member. Why the article doesn't say an upgrade of previous study? The local commercial chamber knows exactly the local situation or not?

Some arguments has to be deep analysed; the way in which the district present itself, the physical flow of the district(money, equipment, information,etc) and so on.

Conclusion

Although Dixet organised itself in a quite detailed way, present itself in a not efficient way;

1. there detailed information on what done only brochure(advertisement spot, not technical),
2. the lack of what technologies are skilled the SME (a possible investor may wants to know which are the real capabilities of a so varied district.)
- 3 which are the knowledge shared between members? Scheduling , emails, course open to member or other?

One key point has to be noted the wish to maintain worker knowledge inside the area, but the way is doubtful.

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ANALYSIS DRIVER PROTOCOL

Tabella II Operational Structure Technical Parameter

<i>Operational Structure</i>	<i>Technical parameters</i>	Note
Spatial Allocation	150 companies in the Genoa area. The Dixet centre	There is partial lack of total area involved

	is located in Sestri-P.te Valpocevera areas, with other main nodes Valbisagno e a Levante areas. Although Dixet Website cites 150 companies the real member involved are 115.	over the total area of Genoa data to better characterize district. WE know only the Biomed area, 30'000 square meter on Colle Erzelli o Piaggio Aero. We can assume quite confident that elevated concentration of SME in small areas.
Job distribution between SME	<ol style="list-style-type: none"> 1. Microelectronics(components , circuital cards, etc) 2. InfoTech (computer science management, multimedia, Internet, e-commerce) 3. Automation and Robotics 4. Telecommunications 5. Biomed (bio medical e bio instrumentation) 6. Aerospace 7. Other technologies(special works, market researches, special materials, etc) 	Different kind of activities sector, from Dixet there is not the data about job distribution between SME. The job cycle of aerospace and Biomed show a pyramidal structure on these sector. Eg.: aerospace has suppliers from micro electronics and InfoTech SME for all avionic parts and software.
Maximum (or medium) rate production of single SME.		Available only for aerospace sector in which airplanes rate production is part of "public contract". ⁹

<i>operational structure</i>	<i>Performance indicators</i>	Notes
Concentration production degree or annual turnover	1000 Millions euro € year entire Dixet. This turnover is to distribute on 7 leader companies (over 200 worker) and on medium (50-200 worker), small size firm (10-50 workers) and micro firm (max 10 workers). The last categories is the most relevant in the Dixet and the less Italian law protected. See Italian laws art 18. or cassa integrazione.	Dixet distribution of companies: Big 5,98 % = 7/115 Medium 4,34 % = 5 /115 Small/Micro 91,3% = 105/150 It is different from common idea on Genoa Industrial Area. Big = 10/150, medium=40/150, small-micro= 100/150
Personale impiegato per partner SME	7500 total worker . 75% working in big companies -25 % medium small companies.	
quantity of transportation system(car, train, etc)	InfoTech sector zero level. All other sector unknown, we can assume very few number means of transport considering the type of products of each sector.	as all program can be distributed over internet at "warp speed". Using 6mb/sec on ADSL line in less than one hour a Ggabyte can be transferred. High complex InfoTech System in some sector, aerospace Biomed ed InfoTech. How many data exchanged is real useful? Are all system integrated ¹⁰ or stand alone?

<i>Management Structure</i>	<i>Technical parameters</i>	Note
Responsibility distributed to single SME	The article of association declare to be equally distributed.	It seems a contrast;7 big has 5 member in Consiglio, 108 companies the other 5 members. The division of member is based on capital turnover?
Information Pattern available to single SME	Every sme refers to Dixet about political lobby and capital funding on research. The financial capital of Dixet is managed by Consiglio autonomously. This money cover the secretariat activities to get the mission objectives and to pre assess commercial contract with other district.	The funding to research or technical transfer how are the distribution rules? The big one take al the capital and then distribute to SME or directly distribute to SME?
Internal agreement and control procedure .	Consiglio Direttivo has routine management control and extra routine management on budget to get mission objectives described in article f association. The C.D can publish guidelines that to be observed by members. The C.D may dissolve the association only in general meeting. "assemblea generale". Any legal match of 2 member is established a a 3	The Consiglio has not only a political reference, but management authority, it can put out a member in case of article association violation. Search opportunities about technological transfer to companies and distribution of European research capital .

⁹ Always (98%) Aerospace companies makes this kind of data available in order to give the idea how good is the company to the investors and to the passengers .

¹⁰ The basic level are emails but system can handle integrated design using one common drawing database, etc.

	person commission, one represents each member and the third chosen in common agreement between the 2 opponents. If there is no agreement on third judge, this judge is nominated by Genoa Court.	
Type of agreement with external companies		

<i>management structure</i>	<i>Performance indicators</i>	Note
type of management structure	Representative association with mission: <ol style="list-style-type: none"> 1. Growth of human resources to satisfy the high level of specialization with dedicated training courses. 2. Recover and transform dismissed industrial areas to set up new high tech companies. 3. Development of InfoTech network and advanced services to promote integration - cooperation between SME of Dixet 4. Activate Technologies transfer methods and create joined laboratories both university and SME and research institution. 5. Promotion of Dixet at national , European and international level. 6. Set up and active link and cooperation with other industrial cluster (Italian or European). 	If comitato is representative how can edit guidelines to be followed by members?
Coordination board type	Consiglio Direttivo	
Coordination Strategy / protocol type	General Assembly or Extra General Meeting with all voting members. Each member may represent another one absent with authorization of other one, but each member can't have more than 3 authorization.	So it's limited a cartello against a question especially against big one. No member of Consiglio can have an authorization in order to avoid conflict of interest.

<i>Social and Economical interactions</i>	<i>Technical parameters</i>	Note
Commercial agreement type with supplier or clients	Info available for the sector: aerospace – production on client order spreading many years. BIOMED- hospital systems(emergency room) production only on client order. Other sector we assume follow the question market law.	One commercial district agreement with RINA to promote a quality system production between members
Production strategies type	Annual	Exception Piaggio aero industries and ESAOTE s.p.a , respectively aerospace and Biomed sector, have several years scheduling production.
Job Cost and job market limits/laws	High cost due a fully qualified personell and ruled by national contract for industries above 16 workers. Usually high for companies under 16 worker, but workers have no protection laws, see Italian law art 18	

<i>Social and Economical interactions</i>	<i>Performance indicators</i>	
Product Market coverage percentage	ESAOTE 90% Italian Biomed Market . ESAOTE 6% worldwide magnetic resonance device.	News available only for 1 Biomed company and for specific market.
Percentage of district employee over the resident people.	7500 employee (over 50% graduated) over 650'000 resident people = 1,15 % . Info is related only to the Genoa city not to province as production is concentrated in few areas.	More interesting data the graduated employee against the graduated people resident, but data are not available to public.