

PROCESS MODELLING APPROACH TO FACILITIES MANAGEMENT

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Abstract

Facilities are part of a business. They therefore should be run like any other business sub-unit. This business approach should go beyond the mere selling and buying of buildings into complete understanding of all use factors and their relationships with other business units. In accordance with business stipulations facilities should be managed by facts. In contemporary business world there is no room for non quantifiable business actions. A forum through which requirements are standardised would ensure the continuous support of business by facilities. A further benefit of this approach is that it would enable the manager to communicate with any construction experts whose time limited intervention may be required. Facilities are going to be a factor in business competitive advantage in the future.

This study establishes the information needed to guide the normal daily operations in facilities and hence establishes the link between the buildings and business. The approach enables the incorporation of key indicators and factors which a firm needs to further its business objectives. The data so produced can be standardised for ease of use. The danger posed by rigorous planning systems devoid of input by management is identified and avoided through the creation of appropriate windows for management to express their views and make necessary changes if expedient.

Key words: Process modelling, use factors, planning, operations.

1. INTRODUCTION

Facilities are all those aspects of business that may include physical tangibles that are needed to enable and sustain the realisation of management objectives. The term facilities refer to both the physical environment and their use. To manage facilities is to ensure continuous achievement of management objectives in the facilities. This calls for a co-ordinated approach involving all the activities in the facilities. The challenges to management of facilities include having to deal with

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transitory situations involving activities and even products. This means that carefully planned facilities can fall into obsolescence if care is not taken to continuously relate business needs and the environment. So it is very necessary to figure out how one can take care of these business changes and also changes which are purely time dependent like ageing. Over emphasis of maintenance and replacement aspects of facilities management has left many firms regarding facilities as overheads and strive to "optimise" the facilities by reducing costs as much as possible, sometimes at the expense of functionality needs. The need for effective tools for facilities managers to assist in the management of their portfolio has long been identified by research.

1.1 Facilities factors

Facilities are part of a system that implements management objectives for both its internal integration issues and external survival issues. Facilities factors include products, activities and the system that implements them [Normann, R, '91]. This implementation system comprises clients, personnel and the physical support and technology as shown in Fig. 1. A working equilibrium is required to enable facilities to really take up their role in the equation.

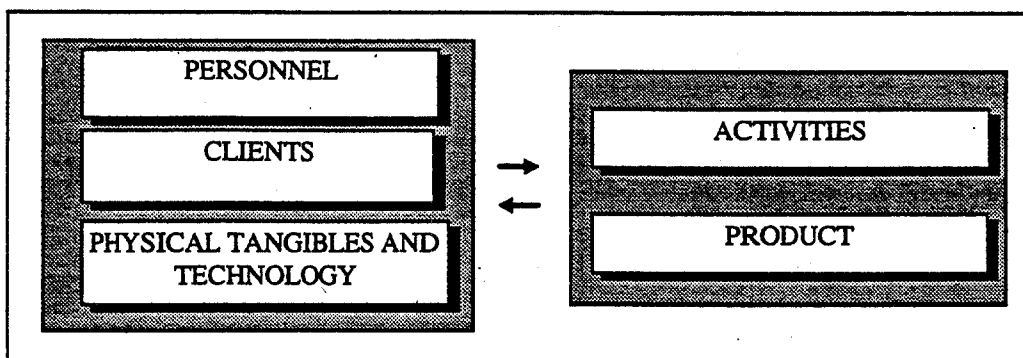


Fig. 1: The players in a facility equation

1.1.1 Products.

Whether a firm is in any one of the economic areas of service, manufacturing or agriculture, it will be dealing with the generation of some products. In almost all cases these products constitute the primary reason for the firm's being. These products should be understood together with any change and quality dimensions and how these dimensions are affected by the facilities.

1.1.2 The activities

All the activities in the facilities are ultimately linked to the products. The products expected and the exact activities needed to generate them at each place

and occasion should be establish. These products could be of service or tangible nature. It is necessary to closely link product activity and business objectives. These activities need to be subject to such requirement as quality, time influence and change. A variable like change is difficult to takes care of effectively especially if it involves unexpected factors.

1.1.3 The business implementation system

This system comprises the clients, the personnel, the physical support and the technologies involved. The importance of this third category in the overall equation cannot be overemphasised. Activities and product as specified above are for the benefit of the clients if one wants to stay in business. But the product and the activities can only be implemented by the personnel who in turn depend on some kind of physical support (Buildings and technology) to enable the realisation of the goals. One common denominator for the activities, clients, personnel is that they all need the physical environment and technology. A business has overheads and revenues. Typically about 75-80% of business operating costs represent the salaries of workers and only about 10-20% of the operating costs are spent on tools, devices, equipment and facilities. The value of the activities and products on the other hand is very high. This is why facilities must be considered as value adding. Managing the activities and the products without the environmental considerations is not enough. So how does a manager take care of this maze of relationships and causalities? The solution lies in understanding the relationships and the factors.

2. LITERATURE REVIEW

Research in the field of facilities management has turned up an impressive body of work in the area of working environment. Questionnaires have been developed for the purpose of assessing whether the users of the spaces are satisfied. [van Wagenberg et al, 90] A list of some of the environmental ergonomic factors can be found [Kupsh, J., et al, '90] which describe environmental needs of the workers. It is more beneficial to the business to relate these environmental feeling of the workers to the business activities and outcome. Perhaps if it were known how the dissatisfaction affected business then it would be very helpful.

The need for a quality program is another aspect of facilities that has been given some research treatment [Jaan Meri, '93, Burati, J. L et al, '92]. Studies have been carried to establish quality programs for mainly the products that are produced in the facilities and the activities surrounding them. Customers have also been considered. These quality programs constitute a good management tool for facilities especially if they are broadened to include all factors from decision rules to the tangible surroundings. Quality programmes have long been recognised by their potential value to the firms. This is more so if the quality is pervasive throughout the organisation. The construction industry has now joined

the manufacturing industry in adopting total quality management (TQM). The two principal objectives of TQM being, (a), customer satisfaction and (b), continuous improvement [Burati et al, '92) are both very relevant to facilities management. There is also the management by fact requirement which means that managers of facilities should clearly understand the factors involved. This study divides the activities products, implementation systems into either customers or suppliers and attempts to maximise satisfaction of the customers and also suppliers. Quality is not a panacea for all management problems and must be considered along with other structural requirements. The return on quality approach, ROQ [Roland T. Rust, '95] is one way of dealing with quality. ROQ assumptions are:

1. Quality is an investment
2. Quality efforts must be financially accountable
3. It is possible to spend too much on quality
4. Not all quality expenditure are equally valid

Real estate is another area which has attracted much interest in research [E Reed Stvan, 92]. Issues dealt with include real estate values, outsourcing, space management, energy management. The role of communications in service management has been identified [Zeithaml, V. A, '85]. Communications are equally relevant to facilities since buildings provide a service to business.

3. SCOPE AND OBJECTIVES

This research looks into the issue of how to relate facilities to business and hence enable the facilities to continuously support business aims. It propositions that facilities appropriateness to businesses is only established by a firm's own knowledge of the use factors and how they relate to business objectives and not by a time limited intervention by construction experts. It can also be said that in contemporary world of business no aspect of business can accept non quantifiable information. There should be a standard with a minimum information set to provide this vital link between the facilities as a service to the business and the business objectives. Six sets of factors were identified as being those that need to be considered. They are:

1. Decision rules factors
2. Needs factors
3. Resource conversion factors
4. Facilities services to business factors
5. Appropriate tangible factors
6. Evaluation approach

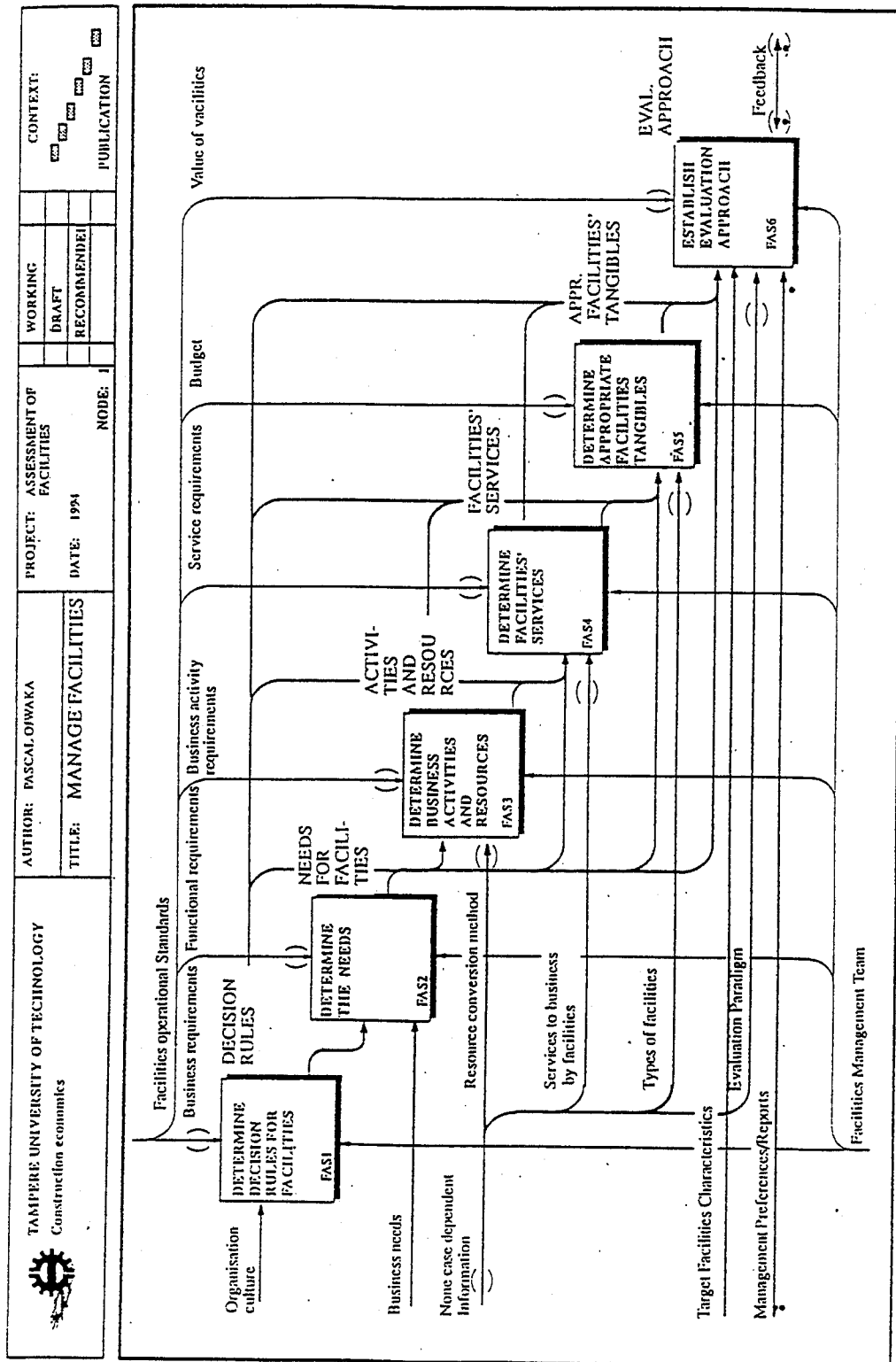


Fig. 2: Activity models

These factors were considered to be broad enough to take care of all the issues involved. The models produced provide a framework for establishing information flows into the system.

3.1 Assessment and control

One of the objectives of this study is to enable the control of facilities factors. Control and by extension assessment is a natural part of management. This is partly due to the fact that it enables evaluation of the objectives and also points management to the right direction in case they stray off course. Assessment is part of a strategic control system. Control systems are needed to verify the premises that the chosen strategy will yield the organisation's objectives. Control process should pinpoint existing problems or potential problems by comparing performances to predetermined objectives. Implementations of any objectives may run into some problem primarily due to human failing or other related problems. The control process involves three stages namely [Dessler, G, '85], establishment of a standards or goal, the measurement of performance against this standard and finally the identification of deviations and the taking of corrective action. The standards may be qualitative or quantitative but should mirror exactly the objectives of the firm.

4. MODELLING

The approach used here has the purpose of creating a management tool to be used by facilities' managers to plan and operate facilities. The aim is not to develop a vast information system to store all kinds of geographic information and operational information. A complicated system of that sort will need data handling and information upgrading by experts and might run as an isolated information technology department that is remote from management needs of business. This might result in the system not be consulted by those who need to make decisions. Information on physical tangible aspects of the buildings are easy to quantify and store but are of limited use in every day management.

Process modelling is an act of developing a description of a system. It is used to enable the understanding of complex social, economic or technical systems by allowing a quick display of the behavioural consequences of a particular model structure and enable a rapid structural analysis to be performed. Structural analysis and design technique, SADT, is the modelling method used here. SADT is "a complete, concise and consistent description of a system which is developed for a particular reason" [Marca, D. A and McGowan C. L, '88]. The modelling streamlines and categorises the information needed to plan and use facilities into activities, input, output and control information.

Each activity module generated shows inputs, outputs and controls. These constitute the normal decision variables that a firm needs to manage the facilities. Each process module will result in outputs which can be used as inputs into other modules. All steps needed to define and provided a fully functional and business supporting facilities are considered. The steps are broken into hierarchies and sub-levels until they are deemed to be sufficiently defined to enable implementation without any obstacles.

4.1 Model results

The facilities planning process is divided into six conceptual phases as shown in Fig. 2. Each of the phases identifies a sequence of steps addressing various needs of the facilities system. These phases are

1. Determine the needs
2. Establish business decision rules for facilities.
3. Establish business activities and resource needs.
4. Define appropriate facilities.
5. Establish operations approach for facilities
6. Establish evaluations approach for facilities.

The following are some descriptions of the model outcomes.

4.1.1 Non case dependent information

For effective planning, all relevant information should be gathered. The information should include the state of the art facilities information for the industry concerned and information on competitors facilities. It is unlikely that any firm would have all the current information on the kind of facilities that would best serve its interests. The information gathered should be categorised into product, activity and implementation system factors. The items of information that should be sought include buildings types and shapes information, information on resource conversion and information on services to the business.

4.1.2 Establish rules for decision making(FAS 1)

Facilities are provided for the sole purpose of providing a service to business. Therefore they must be tailor made to support the business and to enhance or enable the realisation of objectives. This module assumes that the business that needs facilities already has its organisation culture and strategy. This organisation culture information is fed into this module as an input. This modules seeks to establish in clear sequences, hierarchies and decision categories, the facilities decision support information needed if the facilities are to support business. The standards guiding operation in the industry are used as controls for this module.

The sub modules for this module are needs rules, activity rules, product rules, service rules, tangibles rules, maintenance rules, ownership rules etc.

4.1.3 Determine the needs(FAS 2)

The role of the facilities in as a business sub unit is established here. The factors leading to the demand for the facilities are studied and a thorough problem analysis carried out. The exact problem to be solved should be unearthed. The entire business implementation system of which the facilities are apart are studied to establish its needs. Alternatives to any suggested solutions are evaluated. Outsourcing possibilities as a solution are also investigated. Once the needs are clearly established then further planning should proceed. This module is divided into problem identification, objective establishment and user expectation modules.

4.1.4 Determine business activities and their objectives(FAS 3)

This phase deals with the establishment of all the resource conversion activities for which the facilities are expected to be a service. It also determines the resources needed for the activities. This phase therefore needs the firm's organisation culture information especially as it relates to work design. All the business activities should be enumerated and their particular needs listed and the various decision levels for these needs isolated. Typical business activities needing facilities service could be, administration, production, sales, control and correction, research and development activities. The sub-units for this module include work design, flexibility considerations and ambience.

4.1.5 Determine the services of facilities to business(FAS 4)

The operation or the running of the facilities enables the firm to impart on the users the exact kind of service they wish. The services provided involve control of the allocation of the assets and the sustenance of the facilities physical and ambience to levels acceptable to the firm. As part of maintenance of quality, the facilities manager needs a system which logs complaints, suggestions, request and sort them out in order to determine any inconsistencies and finally acts to correct any problems. Dealing with both planned and unplanned change, risk, crisis are among the duties to be handled at operations stage. The major activities here include resource management, co-ordination and communication management.

4.1.6 Determine appropriate facilities tangibles (FAS 5)

This phase is divided into six main sub phases. Information from strategy module and activities and resource needs are used as inputs to this module. Information about spaces, type of facilities and activities and the resources needed are established here. Once the locality to construct the facilities has been determine the next step is to determine the type of facilities needed and which is best able to

serve the firm. The rules on the types of facilities best able to serve the firm is invoked here to select the type needed. A configuration detailing how the different parts of the whole facility are put together is determined. Facilities may include buildings and external infrastructures for them or might include just one single building. Suitable architectural types are also considered at this point. Location centralisation and teleworking are some of the considerations. Geotechnical requirements may sometimes limit certain kinds of buildings. Certain items like parking for the individual buildings within the facilities are established.

4.1.7 Establish evaluation procedure, (FAS 6)

In order to sustain the support of business by the facilities, from times to time the firm needs to be able to gauge whether the facilities still support business. This is the examination of the facilities against the background of all the planning needs and activity needs. The output of this module is facilities status. The inputs for this module include the use characteristics of any target facilities. All the activities at this level are carried out from the point of view of the facilities management strategy, tactical and operation needs.

4.2 Product models or conceptual models.

Conceptual or product modelling uses the result of the process or functionality modelling and sort out its input and output items into concrete and abstract forms as shown in Fig. 3 and 4. This is an analysis phase whose purpose is the determination of the needs of the system and the production of a system model. The requirements of the system include a complete feasible statement of what is needed in the system and the functional operations and their characteristics. Object oriented analysis, OOA, [Peter Coad, P., Yourdon, E. '91], is used in the modelling.

4.2.1 Problem domain

This is the field of endeavour under consideration. It includes products, activities and physical support and their management. The term facilities include the physical buildings, the external environment and the internal environment. The external environment includes infrastructure of the locality and the availability of industrial support facilities and factors. The internal environment refers mainly to the ambient characteristics, safety and security.

4.2.2 Systems responsibilities.

This phase establishes the concrete information for responsibilities of facilities management. The overall responsibility of the system is the maintenance of the use environment to ensure the support of business by the constructed facilities. This support of business takes care of not only time dependent maintenance needs

but should ensure as little disruption as possible even in the face of need changes. These need changes can be mainly to organisation culture changes or even the onset of technology changes. There could also be an industry wide trend changes which may have appreciable repercussions to use characteristics. The systems responsibility include the cushioning of the organisation from the effects of any adverse changes by careful management. The functions of operations management in the facilities are considered as being use, maintenance, co-ordination and change management. The system should have a forum for taking in changes and also control handles needed to. Understanding the activities of the system being studied, its constraints, its duties, its concrete and abstract data. Typical results:

- Problem domain definition
- Systems responsibilities.
- Classes and objects involved.
- Role of the management structure
- Services required by the system.
- Maintenance

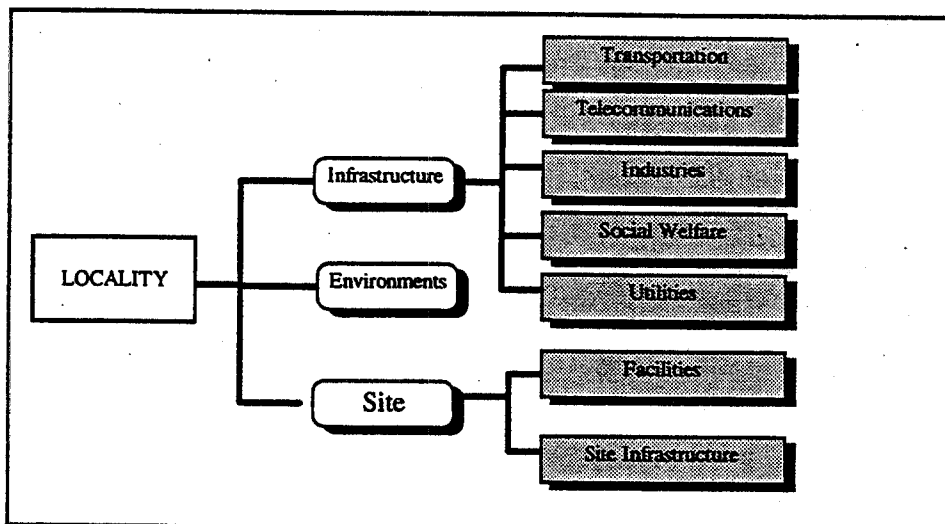


Fig. 3: Typical information flows for locality

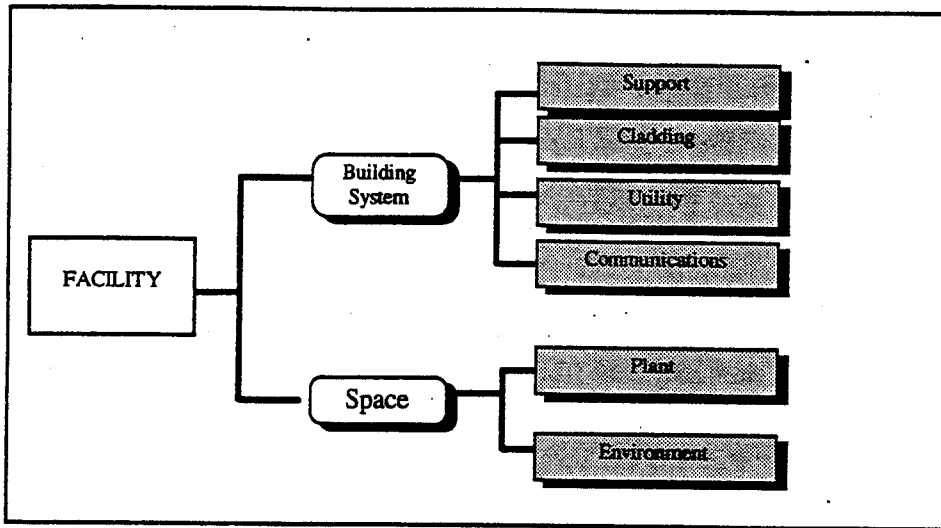


Fig. 4: Typical information flows for facility

4.3 Data modelling.

The next item of analysis is to establish how the various information flows are related to each other. A typical case is shown in Fig. 5. This involves entity relationships which relate the various data to each other to develop a network of data that can be accessed.

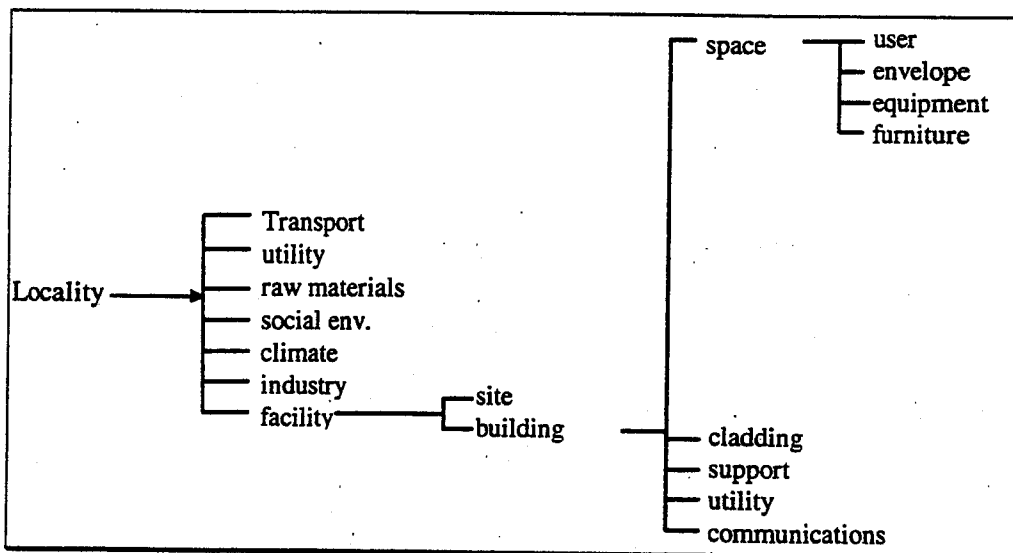


Fig 5: Typical data relationships for information gathering

5. CONCLUSION

This study has looked at the factors that influence the use of facilities and hence provided a framework that uses a holistic view to establish a concept that can be

used to manage facilities regardless of the type of industry they are in. This view will enable management to accord facilities management its rightful place and ensure value adding. The framework is a flexible system that allows each firm to use its own unique circumstances to determine the status of their facilities or simply to enable smooth management.

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