ENHANCING REAL ESTATE INVESTMENT THROUGH TERO- VALUE TECHNOLOGY

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The concept of tero-value technology was coined from terotechnology and value management. Development viability is highly influenced by capital and recurrent cost (life cycle costing). Development market is becoming very competitive and professionals have to be innovative to survive the competition and also to give their clients value for money. Using data from a sample (n=40) of Estate Surveyors and Valuers, the influence of terotechnology and value management on development cost (both capital and recurrent) was examined. The relationship between terovalue-technology and investment viability was also investigated. A case study of one development project was examined to see the impact of terovalue technology on project viability. Analyses conducted using descriptive statistics and mean item score revealed that the use of terovalue technology in real estate investment reduces the incident of undesirable capital and recurrent cost. The use of terovalue technology in the administration of development projects should be encouraged as this enhances the achievement of value for money spent on such projects.

Keywords: real estate investment, tero-technology, value management.

INTRODUCTION

Investments in real estate could be for a variety of purpose. The ability of a development to satisfy the purpose or group of purposes will enhance its desirability. Expected investment return is therefore, a major pre- requisite for real estate investment decision. An investment can generate returns in three ways:

- By generating a flow of income (or reducing income tax)
- By generating a return on capital (or reducing capital tax), whether it be less than, equal to or in excess of the initial sacrifice or
- By producing a psychic income, a positive feeling induced by investment ownership. Investment return is therefore a function of income, capital and psychic income.(Baum and Crosby 1996).

Rational decision making is required in packaging real estate development to achieve these goals, otherwise investors will shift their funds to other forms of investment which they consider to have better performance or more attractive. Ideally to measure real estate investment performance, we would like to have data on prices for all investment property transactions- ranging from hotels to warehouses to apartment units taking place in an economy, a detailed description of the land, improvements, and cashflow produced by these properties. (Bruegeman and fisher 1997). The physical components of real estate will no doubt affect its performance in terms of

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returns, both in economic terms or otherwise. Apart from the physical components, other aspects of real estate investment equally affect the performance in different ways. Sustainable assets management which will take care of life cycle costing is most desirable in achieving good operational result in any real estate investment. Successful decision-making in real estate requires careful analysis of the risks, and the returns offered by an investment opportunity (Allen and Floyd 2005). The process involves:

1. Evaluating a development competitive environment.
2. Forecasting the expected cash flows that will likely accrue to the investor and
3. Making a final decision on whether to proceed with the development.

Terotechnology and value management (value engineering and analysis) have a direct influence on the out come of the process. A lot of investors don't consider life cycle costing in their development and this result in high life- cycle cost with high service charge implication on tenants. High lifecycle cost will definitely affect the operating cost and the net income of the investment. On the other hand, a lot of developments in Nigeria are complicated with undesirable costs, which have a direct implication on the capital cost of the project. The implication of this is that capital out- lay will be high, interest payment on borrowed fund will equally be higher and pay back period will be prolonged. In addition to the need to adopt these two concepts, integrally, their mutual integration will give better value for money as lack of their use now is a major cause of most development failure in Nigeria today. The few developments that apply the two concepts do so in isolation. By implication, it is either value engineering or terotechnology or do both unconsciously.

Most of the running costs are linked to decisions taken at an early stage of the planning and projecting process i.e. at the definition and design- stage. The life time cost of maintenance is often higher than the initial investment cost. It is therefore desirable to design a set of models and cost estimate to handle, calculate, predict and influence the future operating and maintenance costs.

The objective of asset management is to ensure that the assets deliver the required function and level of performance in terms of service or production (out-put), in a sustainable manner, at an optimum whole life cycle without compromising environmental performance, or organization's reputation. A detailed consideration of terotechnology and value management at the design and construction stage of real estate projects is vital in enhancing development viability as value management will reduce capital cost by avoiding undesirable costs while terotechnology will reduce cost in – use through life cycle cost consideration. Terovalue technology is an integration of terotechnology and value engineering/ analysis.

Real estate development in Nigeria is very expensive due to a variety of reasons which include high cost of capital ranging between 20% - 30% per annum, high cost of building materials as most of these are imported with hard currency, high running cost due to lack value consideration at the design and planning stage etc. There is today greater competition in the real estate market than ever before.

Most businesses are facing great pressure in their attempt to retain the competitive edge. This is coupled to the fact that resources are becoming leaner. Clients are becoming cost conscious both within and outside organizations. Satisfying their need and expectations has become crucial not only to success, but essentially to survival.

Professionals are being required to take on broader roles and responsibility to achieve better integration and compatibility. For private developers to survive in the present

day economy, they will have to embrace terotechnology and value management (terovalue - technology). Value management will avoid undesirable cost in a project. This will bring down development cost. Terotechnology on the other hand, deals with life – cycle costing which will reduced the cost in use of developed real estate and also improve on the comfort and utility to end users. An early integration of these two concepts will enhance project viability due to reduction in both capital and running cost. It will in addition reduce risk and the task of asset managers.

"The view that unnecessary cost is endemic in building design due to Complexity of the process is widely held. There is always a certain amount of unnecessary cost in every design. It occurs for a number of reasons for example:

- Lack of idea
- Lack of cost analysis
- Lack of time
- Lack of information
- Lack of yard stick (Susan 1994)

The private developer should consider these in different aspects of real estate project to survive the competitiveness in the industry and still remain afloat.

AIM AND OBJECTIVES

The aim of this paper is to investigate how an integrated model of terotechnology and value management will help in advancing real estate investment profitability. This will be achieved through the following objectives.

- Explain the concept of terovalue- technology.
- Investigate the extent of the application of value for money in real estate investment decision.
- Demonstrate how terovalue- technology can affect development viability.

THEORETICAL AND CONCEPTUAL DEFINITION OF TERMS

Value Engineering
Value Engineering (VE) is a multi- disciplinary team approach to identify and remove unnecessary costs while improving quality and customer acceptance based on the analysis of function. Value engineering studies can be applied as a tool for identification and elimination of unnecessary facility design, operation and maintenance cost, and for the development of facility performance benchmarks. It involves identifying and classifying the function associated with a product, project, process, or service and allocating costs to the function. Value engineering defines value as the lowest cost method to accomplish the functions required by the customer. The approval is to examine areas that require the greatest expenditure, to challenge the costs and function, and compare the alternates on a cost to benefit basis. Function analysis is the key differential between value engineering and other management processes and procedure aimed at optimizing the cost – benefit ratio associated with investment decisions.(Sievert 1998).

TeroTechnology
Terotechnology is defined as a combination of management, financial, engineering, and other practices applied to physical asset in pursuit of economic life cycle costs (LCC). Its practice is concerned with specification and design for reliability and

maintain ability of plant, machinery, equipment, buildings, and structures, with their installation, commissioning, maintenance, modification, and replacement, and with feed back of information on design, Performance and costs. (Ratcliffe, 1998; Stapleton, 1981).

Tero – Value Technology:
Otegbulu (2001) developed the concept of terovalue-technology from the terms tero technology and value management. Terotechnology deals with cost-in-use model, using life cycle costing while value management is concerned with value for money by eliminating undesirable cost in a project and optimizes value at the design and implementation stages. Terovalue-technology is therefore defined as the application of life-cycle costing and the lowest cost method to accomplish the function required by the customer in a project without compromising value and standard.

Real Estate
Real estate is defined as land and things attached to the land (Allen and Floyd of 2005). Real estate investors usually earn their return from three potential sources. First, cash- flow in a given period of operation, second, tax benefit of real estate investment and third, appreciation on the value of the property over time. (Corgel and Smith, 1992).

THE RESEARCH SURVEY

A survey research was adopted for the study. One structured questionnaire was designed for estate surveyors and valuers. The questionnaires were administered to 60 randomly selected Estate Surveyors and Valuers in the Nigerian construction industry out of which a total of 40 were returned. The questionnaires consist of 20 statements representing value management, tero-technology and real estate investment. The respondents were required to rank the questions on a five-point Likert scale (5 for strongly agree, 4 for agree, 3 for disagree, 2 for strongly disagree and 1 for cannot say). The data obtained were analyzed using descriptive statistics and relative index technique.

RESULTS AND DISCUSSION

Table 1: Respondents' Characteristics

Respondents' Characteristics	Frequency	Percentage
Age of qualification (N=40)		
1-5 years	15	37.5
6-10 years	7	17.5
11-15 years	5	12.5
16-20 years	7	17.5
above 20 years	6	15
Professional qualification (N=29)		
ANIVS	23	79
FNIVS	3	10.5
FRICS	3	10.5
Highest Educational qualification		
HND	12	30
B.SC	15	37.5
M.SC	10	25
PhD	3	7.5

ANIVS – Associates Nigerian Institutions of Estate Surveyors and Valuers
FNIVS – Fellow Nigerian Institutions of Estate Surveyors and Valuers

FRICS – Fellow Royal Institutions of Chartered Surveyors
HND – Higher National Diploma
B.Sc. – Bachelors of Science
M.Sc. – Masters of Science
Ph.D – Doctor of Philosophy

Table 1: shows that about 37.5 percent of the respondents qualified professionally within the last five years. About 79 percent of the respondents are associate members of Nigerian Institution of Estate Surveyors and Valuers, while 10.5 are Fellows of the Institution as well as royal institution of chartered surveyors. Most of the respondents (37.5%) have Bachelor of Science degrees in Estate Management.

Table 2: Setbacks to Achievement of Value Management

Variables	Relative Index	Ranking
Lack of knowledge of the importance of value management	0.95	1
Functional analysis is not frequently used in value management	0.93	2
Inadequate briefing by the client at the start of value management process	0.90	3
Architects strong desire to design monuments with little consideration for value for money	0.88	4
There is a general lack of value management specialists in Nigeria	0.85	5
There is inadequate time in value management workshops to achieve the workshop objectives	0.83	6
Inability of developers to engage the services of relevant professionals in development projects	0.80	7
The construction industry is not ready for value management	0.73	8
The view that your wealth is measured by the cost of your building	0.68	9

Table 2 shows that Lack of knowledge of the importance of value management with relative index of 0.95 is the highest ranking factor that hinders effective application of value management in the administration of construction projects. For the ranking of other factors see (Table 2).

Table 3: Factors That Affect Tero Technology

Factors	Relative Index	Ranking
Inadequate cost/benefit analysis	0.71	1
Poor design	0.65	2
Poor workmanship	0.62	3
Poor quality material	0.59	4
Inadequate planning	0.57	5
Low quality equipment	0.54	6
Lack of technology for maintenance of specialized facility	0.53	7
Poor financial management	0.51	8

Table 3 includes the responses to a series of questions concerning factors that affect tero technology. Inadequate cost/benefit analysis with relative index of 0.71 has the greatest effect on tero technology. (See Table 3) for the relative effect of other factors on tero technology.

Table 4: Measurement of Good Real Estate Investment

Variables	Relative Index	Ranking
Ability to generate good income stream	0.78	1
Location of the investment	0.75	2
Durability of elements and services	0.74	3
Use in which the investment is put	0.64	4
Design specification	0.55	5
Professional team	0.51	6

Table 4 includes the responses to a series of questions concerning a measure of good real estate investment. The best measure of good real estate investment is ability to generate good income stream (0.78).This is followed by the location of the investment (0.75), others according to the ranking are: Durability of elements and services (0.74), Use in which the investment is put (0.64), Design specification (0.55), and Professional team (0.51).

APPLICATION OF TEROVALUE – TECHNOLOGY IN DEVELOPMENT VIABILITY

Terovalue – technology is an integration of the concepts; terotechnology and value management (value engineering and analysis). The integration becomes necessary to give more value to the development. In order to generate the projected revenue, real estate investment or other products for that matter must meet certain requirements or performs certain functions, generally known as functionality.

The functionality will generate revenue or make savings, which will repay the finance. The value of the functionality (value for money) is measured by the ratio of the cost of achieving the functionality (or parts of it) to the benefit it delivers Turner in Sinister and Turner (2000; Pp 1 - 25). Terovalue – technology will give the greatest value to a project as it benefits from both capital and reduction operating costs. This will be demonstrated with a simple illustration in a housing project. In order to avoid periodic repainting, it was agreed that the toilet and kitchen walls of the development should be covered with ceramic tiles. The architect recommended a particular brand and the supplier for the tiles. However the project manager was of the view that the same function can be achieved using another brand of tiles and Supplier. The same was also the case for the vitrified tiles used for floor finishing.

Table 5: Cost Analysis for Floor and Wall Tiles

	Area m^2	**Architects Rate**	**PM's Rate**	**Saving for the total Area**
Wall tile	1800	₦2, 324	₦1, 100	₦2, 203,200
Floor tile	1500	₦2, 879	₦2, 200	₦943, 500
Total savings				₦3, 146700.00

Source: study by the authors 2007.

The above analysis indicates a saving to the sum of ₦3, 146,780 in acquisition cost. Life cycle cost is also put into consideration as the cost of three yearly repainting of the wall is compared with ceramic wall tiles.

Discounted Projected Expenditure for Repainting

- Surface Area of wall: 1800m2
- Painting cost (3 coats) =N450/m2
- Repainting: N300/m2
- Repainting period: 3 years
- Cost of initial painting: N810, 000
- Cost of repainting: N540, 000
- We have not put inflation into consideration

Table 6: Discounted Projected Expenditure for Repainting

yr	P.V	Amount
0	(540,000)	810,000
3	0.75	405,000
6	0.56	302400
9	0.42	226800
12	0.32	172800-
15	0.24	129600
18	0.18	97200
21	0.14	75600
24	0.10	54000
27	0.08	43200
30	0.06	32400
33	0.04	21600
36	0.03	16200
39	0.02	10800
42	0.02	10800
45	0.01	5400
48	0.01	5400
Total present value of painting		2419200

From the above Table the total present value of the paint option is higher than that of wall tiles. If inflation is added, the difference will be much higher.

Repainting will also involve some inconvenience to the occupies. This analysis can be applied to other building components/ services particularly energy due to high tariffs arising from reforms.

The starting point of life cycle cost approach is that capital and operating cost are intimately linked and should not be treated separately. It follows that if management decision and control system are to be compatible with life cycle output and recommendations, there must be at least some, if not complete, integration of capital and operating budget procedures and standard method of collecting and presenting relevant data. Townsend (1984; P, 83 - 107).The above statement agrees with the view in this paper that integration of capital and life cycle cost consideration will give the highest value for money. The term terovalue- technology will make development planners to be conscious of the need for integration at both the planning and implementation stages.

The application of the value technology will be illustrated graphically as in fig: 1

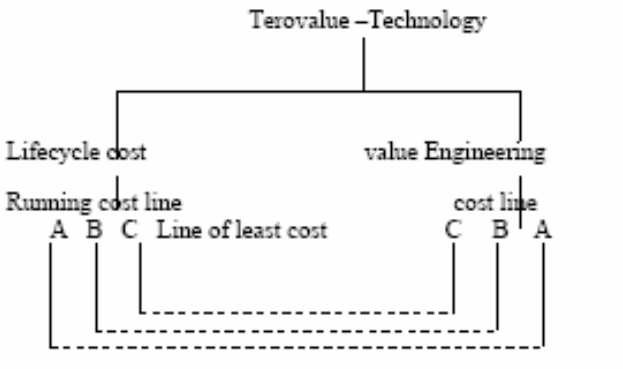

Figure 1: Terovalue Technology Model

There is a need to provide a passenger lift in a high rise building .in general term, there are principally two groups of lifts X and Y. Lifts under group X have high life-cycle cost while those in group Y have low life-cycle cost.

Based on the principles of terotechnology, we choose group Y. But group Y have different varieties [A, B and C] of equal efficiency, but at different prices. We now look at the varieties in Y and choose the cheapest which will provide the same function and economy as the one with the highest price in the group[Y] .C is chosen as the one with the least equipment cost. This is demonstrated graphically in Figure 1 above.

CONCLUSIONS

The application of tero value- technology in development viability resulted in savings in capital and recurrent costs. This confirms the aim of this study, which is to achieve investment profitability through the use of integrated model of tero technology and value management. The use of tero value model also resulted in reduction in capital and recurrent costs. Although the application of value management is vast in many advanced countries, in examining its application in Nigerian construction industry, the survey results confirm that lack of knowledge of the importance of value management is a major setback to achievement of value management in construction projects. This observation may be due to the fact that most tertiary institutions in the country are yet to introduce value management as a course in their undergraduate programmes. The level of awareness created through seminars and workshops is also limited. Of significance in this study, however, is the finding that inadequate cost/benefit analysis limits benefits derived from the use of terotechnology. One of the highlight in the result is that ability to generate good income stream is the best measure of good real estate investment. This study has explained the concept of tero-value technology and how tero-value technology can affect development viability. It is believed that the adequate application of tero-value model by practitioners will provide an assessment of the model in comparison with the traditional method of achieving savings in capital and recurrent costs.

REFERENCES

Allen, T M and Floyd, C F (2005) Real Estate Principles. London: Dearbon Publishing. .

Corgel, J B and Smith, H (1992) Real Estate Perspective an Introduction. Boston: Irwin.

Dey, D W J (1994) Project management. London: Macmillan Press Ltd. .

Gays, A and Hennbery, J (2002) Development and Developers perspectives on property. London: Blackwell Publishing.

Green, G E and Kolbe, T P (2003) Investment analysis for real estate decision. London: Dearbon financial publishing.

Hoseli, M and Macgregor, B D (2000). Property investment principles and practice of portfolio management. London: Longman publishers.

Otegbulu, A C (2001) Terovalue Technology: An Innovative Science in Maintenance, Urban Behaviour and Property, 9(2), 20-35.

Rotcliffe, J (1978) An introduction to urban land administration. London: Estate .

Sievent, R W (1998) Total productive facilities management. London: R. S. Means Company. .

Simister, S J and Turner R J (2000) Handbook of project management. London: Gower Publishing Ltd. .

Susan, C M (1994) Value engineering and value management college of Estate management. London: White Knights.

Townsend, G M (1984) Life cycle listing for construction report of proceedings on CASLE conference on the role of the surveyor in development Lyplus, March 1984.