Economics of infrastructure management and selective sourcing

Faraz T. Khan[1]
[1]Director, OCG Strategy & Organization Consulting

Abstract – ***This paper presents a services model for management of IT infrastructure based on the core-actual-augmented (CAA) framework. This model allows simplification, categorisation and prioritisation of investments that enhance strategic agility with respect to business goals. The economic competitive market model is then used to analyse feasibility of outsourcing the prioritized IT investments to the market. It is shown that, it is uneconomical to the value of the Dead-Weight-Loss (DWL) for an organization to outsource its assets to the market, unless all internal efficiencies in the form of economies of scale, scope, management and organizational process flows have been optimized to full potential where possible.***

Keywords – ***Alignment, Cloud Computing, IaaS, Infrastructure, Management, Outsourcing, Selective Sourcing, SaaS, Software as a Service.***

I. INTRODUCTION

Business climate has changed enormously over the years and is becoming increasingly transient. Several industries such as the automotive and aviation sectors have moved from a high degree of vertical integration to one of greater reliance on markets for inputs [2, 3]. Networks of collaborative virtual partnerships of organizations have emerged in an attempt to address volatile competitive, social and environmental forces. Whether an organization espouses a prospector strategy, a fast-follower or defender strategy, to appropriately respond to such changes, it needs to have agility and flexibility in strategy, structure, processes, people and its technology infrastructure.

An organization's ability to adopt future strategic postures called for by external or internal factors will, therefore, be a function of the acuity by which it addresses and manages its' infrastructure portfolio.

II. INFRASTRUCTURE

Taking a prospector strategy agency as an example, the organization is underpinned by values of being first-to-market, delivering innovation, quick responsiveness to market forces and developing wide sales and marketing communications initiatives. To remain successful in an uncertain future, flexibility and agility within the organization is fundamental.

Current research [7], suggests IT infrastructure capability having a high correlation to an agency's strategic agility - its ability to readily execute business initiatives or adopt postures called for by market demands.

Borrowing a marketing concept of Core-Actual-Augmented framework [5], to explain infrastructure requirements can highlight importance of a well planned and flexible infrastructure in enabling and supporting the delivery of core business activities. It can show how an agency organizes infrastructure, is of long-term significance to the business. See Fig. 1.

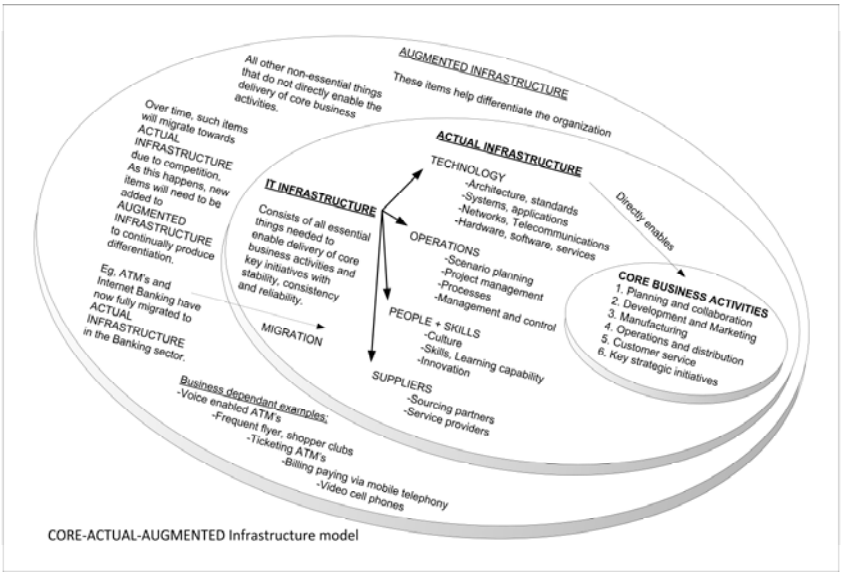

Fig 1. Core-Actual-Augmented (CAA) infrastructure model.

Considering infrastructure as the enabler of core business activities in this way shows that there is a requirement to include more than technology within the infrastructure definition. Such a definition includes four components: Technology, Operations, People and

Suppliers as constituting infrastructure. A lack of measurement, goals and focus on any one of these components would undermine sustained delivery of core business activities by the organisation. Here this is termed 'Actual Infrastructure'.

A salient point of recognition is that, just as core business activities are independent of supporting infrastructure (i.e. underlying infrastructure components may change, but delivery of core business activities must be preserved), so is 'Actual infrastructure' independent of how infrastructure functionality is delivered (i.e. underlying components of technology, operations, people-skills and supplier relationships may change, but the infrastructure's functionality and ability to enable delivery of core business activities must be preserved). This suggests considering infrastructure from a different perspective from one of just architecture, hardware, software and supporting services.

Firstly, the CAA model promotes considering infrastructure from a 'Services' perspective. Whether that be for Infrastructure services considered within a more segmented view as in utility based Cloud computing, On-demand Infrastructure as a Service (IaaS) or Software as a service (SaaS) or more holistically within the full definition of infrastructure defined here, where users buy functional services with attached service-level agreements (SLA's) independent of how these services are delivered [7]. Services can, therefore, be detached from their supplier or delivery mechanism, and so may be sourced internally or from the market allowing for greater flexibility in structuring infrastructure architecture [1].

The infrastructure services concept provides advantages for internal and external organisations alike as it caters for provisioning of implicit measurement, motivation and monitoring of performance using goal-setting [11], [14], via setting of measurable goals and attached SLA's, increasing supplier and employee morale, with anticipated performance improvements. This model allows for categorisation and prioritisation of investments that enhance strategic agility with respect to business goals – under-investments in 'Actual Infrastructure' may restrict agility - the ability to readily execute business initiatives called for by market demands. Over-investments in 'Augmented Infrastructure' may be wasteful by promoting fragmentation, drift (entropy), capacity deficiencies, de-standardisation of infrastructure and possible disablement of key strategic initiatives due to lack of focus. Conversely, under-investment in 'Augmented-infrastructure' may reduce competitive differentiation – something that requires evaluation on a situational and strategic needs basis.

Secondly, as a minimum, it provides a focus on strategic fit of infrastructure activities with the question:

> ***Q*** ➔ *"If we don't have this infrastructure service or functionality within the organization, would core business activity or strategic business initiatives suffer?"*

If the answer is NO to the above question, then that activity is a candidate for 'Augmented Infrastructure' or plain wasteful activity that should be eliminated. This promotes focus on strategic IT [13], and reminds us as infrastructure architects to make choices that reinforce organisational components of strategy, structure, processes, people and technology to promote organisational fit [12].

Thirdly, this questioning approach points to infrastructure planning as an iterative process requiring a lifecycle approach, incorporating identification of choices, categorisation, prioritisation, compromises and reassessment cyclically, that is based on a linked business-technology strategy. See Fig. 2.

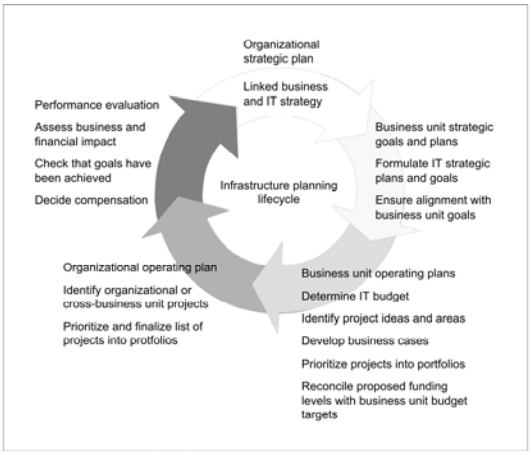

Fig 2. Infrastructure planning lifecycle.

Research [7], shows that if an organisation is able to identify its future desired strategic agility requirements, then it can identify corresponding infrastructure services that will require attention and management within its infrastructure portfolio to enable competitive advantage.

III. CATEGORIZATION OF ASSETS

Within the CAA framework, infrastructure assets can broadly be categorized in two high-level areas; Actual-infrastructure and Augmented infrastructure. Within these two categories, assets can be prioritized according to standardized decision factors, taking into account business aspects, market considerations and technological capabilities. See Fig. 3.

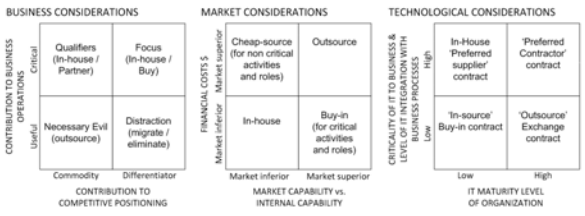

Fig 3. Standardized asset prioritization matrices

IV. SELECTIVE SOURCING

Since a considerable portion of the technology budget and management's time is spent on operations to facilitate internal technology portfolio functions (see Fig. 4.), each with either a clearly measurable ROI or otherwise, how an agency identifies, categorizes, prioritizes and manages its infrastructure portfolio today and into the future requires prudent evaluation [6]. A loosely vertically integrated organization that uses markets from time to time needs to be careful in justifying why and under what circumstances it will use markets for inputs.

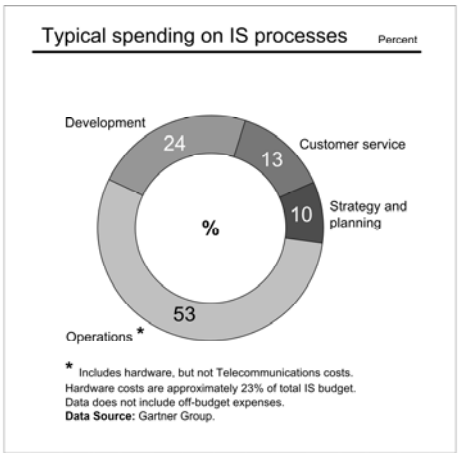

Fig 4. Typical organizational spend on IS processes.

Economic theory – the competitive market model [4], suggests market clearing creates efficiencies in the market. See Fig. 5.

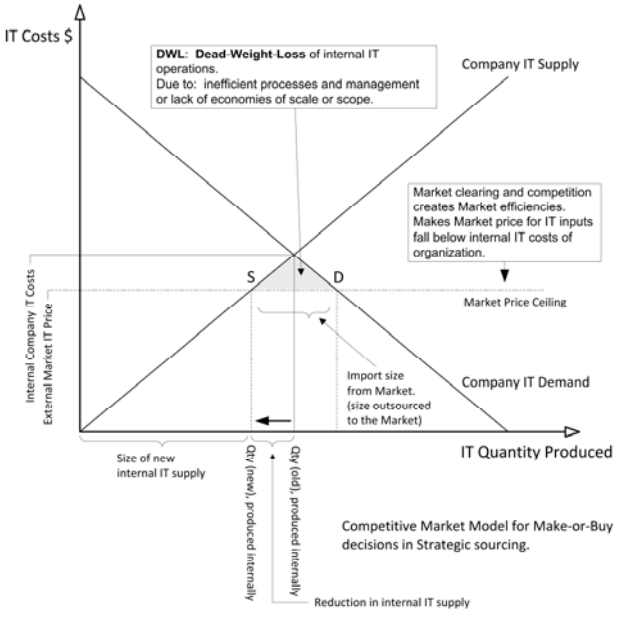

Fig 5. Selective sourcing make-or-buy economic model.

If the market price for inputs is lower than produced internally, then it appears to make financial sense to use the market and selectively-source. However, this scenario raises a number of questions:

Firstly, if the market price is lower than internal costs, it suggests that the market has achieved efficiencies the organization has not been able to, either because of ineffective operational management, inefficient processes or not achieving economies of scale or scope. Assuming the external market is financially viable; the model suggests that market participants are achieving such operational efficiencies profitably from their clientele in return for services provision. If so, there is an economic Dead-Weight-Loss (DWL) that indicates room for improvement in terms of operational efficiencies and economies of scale and scope to gain price parity, that may be possible within the internal IT organization but has not yet happened – an area for investigation for the business. Not to do so would be giving away economic value equivalent to the DWL (see Fig. 5.) to the market in the interest of short-term financial savings as represented by the lower external price.

Secondly, the question then must be: Why outsource? It must be for reasons other than costs alone. Possible answers are to enable focus on core-competencies and to offload assets and processes. While offloading assets increases Return-on-Assets (ROA) utilization producing greater economies of scale and increasing Return-on-Equity (ROE), such a position however, may be short-lived. Such a scenario may restrict infrastructure's ability to cater for market price ceiling or demand-supply movements or strategic posturing, leading to higher operational cash flow and operational costs requirements, undermining business viability. This suggests core assets fundamental to business should remain in-house, while offloading non-core assets to reduce business risk. This is confirmed by the presence of contracting agency-problems leading organisations to 'Back-sourcing' practices [8] (bringing core IT functions back in-house), to increase flexibility and avoid possible revenue-negative situations associated with large scale or long-term outsourcing.

This leads us back to question the sustainability and financial viability of the market-clearing price. If unhealthy competition or unusual geo-strategic market pressures have created the lower market price ceiling, then sooner or later it will require market correction due to margin pressures on suppliers. This may generate wide swings in labour availability, supplier capability, and service-levels, eroding underwriting of agreed service level agreements. This suggests retaining sufficient skills and knowledge assets in-house as insurance against such events and to enable informed evaluation of supplier performance and sustained competitive advantage of the sourcing agreement.

Thirdly, market-correction issues also suggest that user organizations of the market bear some responsibility for creating such a scenario, primarily due to pricing pressures applied on suppliers in negotiating deals in attempting to secure maximum financial value for themselves. It makes economic sense to share this financial value with market participants to develop vendors, in the interest of stabilising market corrective forces. This will enable more suppliers to remain in business and in healthy competition, creating internal operational efficiencies while securing benefits for both the user organization and the supplier.

In summary, organizations should consider outsourcing non-core assets in an attempt to improve strategic performance, though, it should only be considered after all internal efficiencies have been leveraged to full potential where possible.

V. IMPLEMENTATION CASE STUDY

Situation overview – A government funded entity manifested many symptoms of poor performance against its value proposition. Economic profitability was at negative 34% pa, costs were increasing at 3.6% pa faster than revenues, margins were declining, 59% of staff being unproductive up to an hour per day, with 53% of clients sampled, reporting low value-add or needs unmet. A project sponsored by the client CEO was undertaken to identify opportunities to increase profits and efficiencies and decrease costs to improve performance.

Analysis and teamwork – First, the causes underlying the symptoms of poor performance were discovered. This diagnosis was done via a multi-dimensional cross referenced investigative methodology, comprising rigorous financial investigations, process mapping, structured and unstructured interviews, tailored online surveys, and a comparative industry segment study. This methodology isolated inconsistencies in readings and analysis to reveal true cause and effect relationships.

Second, this was followed by an in-depth analysis of the entity's internal and environmental issues. Investigations of service line and technology spend alignment with business drivers revealed a sizable imbalance in focus on capability building spend versus transactional spend, with 51% of category spend misaligned with key business levers and assigned to low value areas. See Fig. 6, Fig. 7.

Significant inter-service line subsidization became evident as contributing to falling performance. Other issues uncovered were a diluted business focus, inefficient processes, acute funding limitations, silo operational culture across its service lines with moderate levels of resistance to change, and ineffective IT capability.

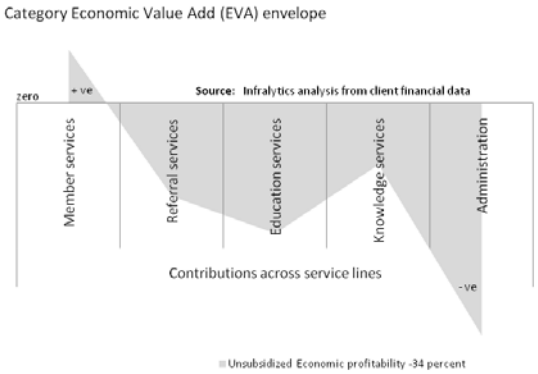

Fig 6. Client economic profitability profile

ICT issues uncovered were: Lacking IT leadership and limited business–IT relationship, top management leaning towards indifference to IT issues or its value, not considering it as a strategic partner. Acquisition of external skills historically was unaffordable due to salary structures being incompatible with market price for the required capability and uninformed ICT buying decisions also present.

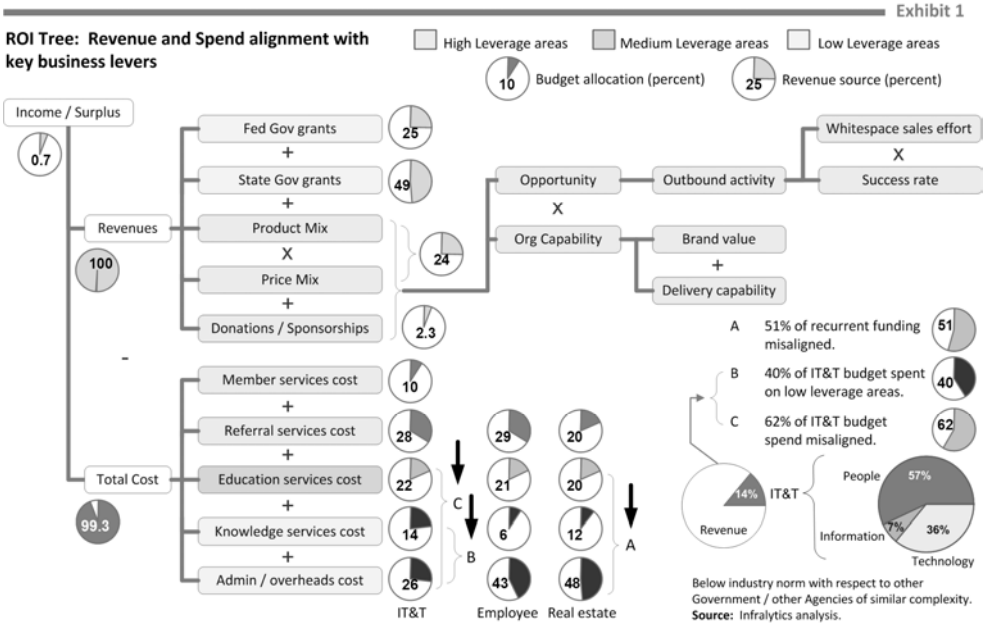

Fig 7. ROI Tree, revenue and spend alignment with business levers

Third, necessary hard, soft and green transformation initiatives were prescribed that realign organizational and ICT resource allocations across the ROI tree [9, 10], with organizational goals to achieve an improved balance of service quality, risk and cost while improving organization-wide performance, budgetary liquidity and financial sustainability.

Consequently, a funding increase in ICT was proposed. Using the CAA model as a guide and a detailed version of the organizational ROI tree, the engagement team iterated through the infrastructure planning lifecycle shown in Fig. 2. ICT projects were recommended to be business-aligned, prioritized, reduced, and sequenced. ICT performance was to be appraised and recognized based on business outcomes (e.g. reliability and capability development), not technical outcomes. An agreed time schedule, jointly with the business, was designed with a structured review process, to monitor and track progress. An elevation of the ICT management's role as equivalent to other senior managers in the organization was suggested, with their compensation package linked with business outcomes. A narrowing of the technology footprint was recommended, by increasing the degree of systems and network standardization across operational units, greatly reducing complexity and cost. By eliminating low value operational work, consolidating user support requirements, and narrowing the technology footprint, a reduction of "low value" staff levels (e.g., maintenance) by nearly a half was possible, while introducing the required number of business applications and infrastructure managers, achieved by the increased budgetary liquidity. The prescriptions across service lines increased reliability, leading to greater technology adoption rates for users and return-on-assets (ROA) utilization, producing greater economies of scale and efficiency, increasing return-on-equity (ROE) of the entity.

The result – This and other similar projects have revealed significant opportunities to improve performance and the alignment between business and IT. Specifically, the financial benefit scenarios of transformation were: a minimum average benefit with ($p = 1$), 16 percent funding liquidity gains per annum, or depending on options exercised, the likely average benefit with ($p < 1$), 22 percent funding liquidity gains per annum, (where: 'p' is the event probability). These surpluses are available to be redirected towards high priority organizational goals. And, notable non financial benefits of transformation were improvements in:

1. Reduction in funding constraints, enabling fund diversions to high priority areas.
2. Informational capability, with decreased reliance on individuals, leading to lower organizational risk.
3. Alignment with consumer, organizational and end-user needs, due to informational capability.
4. Increased employee and end-user readiness to change, due to longitudinal user engagement process.
5. Staff utilization efficiency increases of 24 percent without increasing net organizational costs.
6. Increased reliability and return-on-assets (ROA).
7. Increased responsiveness to environmental demands with rapid business scaling capability.
8. Ability to influence Government political landscape backed by empirical data and lean practices [15].

VI. SCOPE FOR FURTHER STUDY

The practical work presented in this paper is one of three individual implementation projects to date, comprising wide organizational and technological aspects. As consulting practitioners, given our commercial charter to deliver long-term value to organizations in the form of increased revenues, decreased costs or increased operational efficiencies, commerciality has so far prevented other relevant implementations. Our projects to date have not implemented the CAA model in isolation from the wider organizational considerations. Our initial data shows encouraging results achieved from implementations where the CAA model is combined with wider organizational components, and suggests more like projects or isolated CAA model implementations need to be made operational before reliable improvement results can be indicated with a high degree of confidence.

VII. CONCLUSION

This paper has presented a services model based on the core-actual-augmented (CAA) framework, for the categorization, prioritization and management of organizational IT infrastructure, allowing such assets to be in longitudinal alignment with organizational goals. The economic competitive market model was used to analyse and show that, it is uneconomical, to the value of the Dead-Weight-Loss (DWL), for an organization to outsource its IT assets to the market, unless all internal efficiencies in the form of economies of scale, scope, management and organizational process flows have been optimized to full potential where possible.

This analysis has differing implications for large and complex organizations as compared with small and simpler ones; see Fig. 8. Small organizations that are unable to achieve economies of scale or scope of processes and operations, due to size and low levels of complexity and funding etc, are indicated to benefit from outsourcing non-core assets immediately. Whereas larger organizations possessing room for improvement in scale or scope in operations are therefore conversely indicated to follow the prescriptions argued in this paper and to embark on an internal efficiency program across IT assets before considering outsourcing. Not to do so would be giving away economic value equivalent to the DWL (which may be significantly large in individual cases), to the market in the interest of short-term financial savings.

While internal efficiencies and financial gains have been shown to increase by implementing the core-actual-augmented (CAA) infrastructure framework in combination with wider organizational components, its more credible validation is predicated on implementing more projects across small as well as large organizations.

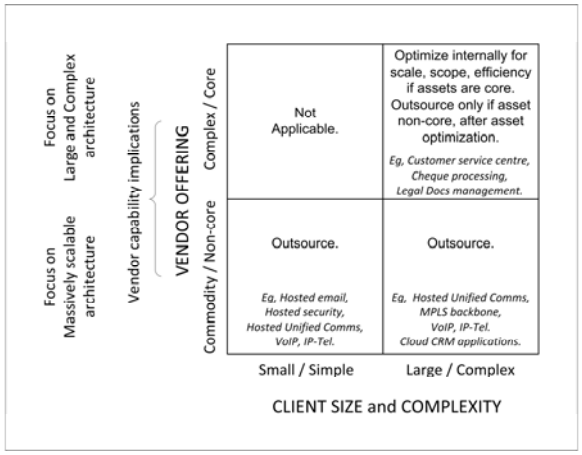

Fig 8. Client and vendor implications.

This analysis also has direct implications for vendors wanting to move into the steadily growing cloud services market. It indicates that from a market entry and an economic perspective, vendors should leverage their existing brand equity and market share and focus on developing massively scalable but commoditized application service offerings with broad appeal that pose the least barriers to adoption from the market, in terms of operational, in-house application integration and security or compliance risks. Vendors should also address concerns about an exit or migration strategy to equivalent on-premise applications, should customers wish to bring the application back in-house due to market consolidation or fragmentation. This will enable vendors to provide longitudinal economic value to the market (as seen in Fig. 5.), while securing fair and sustainable financial gains for themselves, a win-win outcome.

ACKNOWLEDGMENT

The authors would like to acknowledge all past and present clients, whose generous support in terms of access to corporate data in areas of financial, operational and human resources has contributed to the analysis and synthesis of this paper.

REFERENCES

[1] Laartz, Sonderegger and Vinckier, "The Paris guide to IT architecture", *McKinsey Quarterly,* 2000, Number 3.

[2] Milgrom, Roberts, *Does organization matter, Economics, Organization & Management*, Prentice Hall, New Jersey, 1992, pp.9-12.

[3] Besanko, Dranove, Shanley, *Economics of strategy*, John Wiley and Sons, New York, 2000, pp.112-115.

[4] Competitive market model in micro economics.

[5] Core-Actual-Augmented product framework from marketing principles.

[6] Quinn, Hilmer, "Strategic outsourcing", *McKinsey Quarterly*, 1995, Number 1.

[7] Weill, Subramani, Broadbent, "Building IT infrastructures for strategic agility", *MIT Sloan Management review*, Fall 2002.

[8] Craig Healey, "Sourcing strategies", *MIS Australia*, March 2002. – Hirschheim.

[9] B Battles, D Mark, C Ryan, "How otherwise good managers spend too much on IT", *McKinsey Quarterly*, 1996, Number 3.

[10] J Dempsey, R Dvorak, E Holen, D Mark, W Meehan III, "A hard and soft look at IT investments", *McKinsey Quarterly*, 1998, Number 1.

[11] Locke, Edwin A. (1968) "Toward a Theory of Task Motivation and Incentives" *Organizational behavior and human performance*, (3)2: 157-189.

[12] Scott Morton, M (1991) *The Corporation of the 1990's : Information Technology and organizational transformation,* Sloan School of Management, Oxford University Press, New York

[13] Earl and Feeney, 1997, Is your CIO adding value?, *In: Willcocks, L., Feeney, D., Islei, G. (Eds.), Managing IT as a strategic resource*, McGraw-Hill, London. pp. 3-21.

[14] Locke, Edwin A. "Motivation by Goal Setting", *Handbook of Organizational Behavior*, 2001, 2: 43-54.

[15] Z. Randor, P. Walley, A. Stephens, G. Bucci, "Evaluation of the Lean approach to business management and its use in the public sector", *Scottish Executive Social Research,* University of Warwick, 2006.