



Total Value Consideration for Outsourcing

Vijay Vanarase, PhD Candidate, Touro University International, Vice President Systems Engineering, Bally Gaming and Systems, 1670 Brightstone CT, Reno, NV, 89521, P: 775 691 5919, F: 775 852 8474, vvanarase@touro.edu

Marina Onken, Prof. and Dissertation chair, Touro University International, 5665 Plaza Drive, Cypress, CA 90630, P: 714-816-0366, monken@touro.edu

Donna Maria Blancero, Prof., Committee member and PhD director, Touro University International, P: 714-816-0366, dblancero@touro.edu

William Anderson, Prof. and Committee member, Touro University International, P: 714-816-0366, wanderson@touro.edu

ABSTRACT

In last few years, *outsourcing* has moved from “traditional outsourcing” to the next generation called “strategic outsourcing.” Using the strategic outsourcing approach, many companies have reaped the benefits of improved performance, increased access to international markets, access to leading edge technologies, enhanced responsiveness to customer needs, increased productivity and efficiency, reduced costs, reduced cycle time, and improved quality of the goods and services in their organizations.

Even though many companies have proved outsourcing as a successful initiative, does it mean it is always successful? Absolutely not. In fact as per few research reports, every 1 out of 3 outsourcing initiative fails or as many as 46% of initiatives fail to achieve expected or any results. Considering the number of recent failures of outsourcing initiatives, there is a strong need to assess the *total value* it provides to the organization as a whole.

The aim of this paper is to review the evolution of the theoretical framework and to determine the need for considering the “total value addition” approach for outsourcing initiative.

INTRODUCTION

Outsourcing is defined from many different perspectives. Zhu, Hsu, and Lillie (2001) define it as, “the process of transferring the responsibility for a specific business function from an employee group to a non-employee group” (p. 374). Krajewski and Ritzman (2002) define it as, “allotting work to suppliers and distributors to provide needed services and materials and to perform those processes that the organization does not perform itself” (p. 25). However, Linder (2004) has a slightly different perspective on outsourcing, and defines it as, “purchasing ongoing services from an outside company that a company currently provides, or that most organizations normally provide, for themselves” (p. 54).

Initially, the researchers considered outsourcing as a commodity and focused their research mainly on a “make or buy” strategy (Buchowicz, 1991; Buck-Lew, 1992; Welch & Nayak, 1992). Since Eastman Kodak’s outsourcing decision in 1989, the researchers debated on the pros and cons of outsourcing in terms of massive cost cutting, management and operations control, capacity on demand and access to advanced technologies and skilled resources (Apte, 1990; Benko, 1992; Gupta & Gupta, 1992).

As practitioners and researchers saw the benefits of the outsourcing initiatives, researchers then concentrated on processes or functions to

outsource (Loh & Venkatraman, 1992), degree of outsourcing (Lacity, Willcocks, & Feeny, 1996), period of outsourcing (Perry & Devinney, 1997), number of vendors (Willcocks, Lacity, & Fitzgerald, 1995), and contract management (McFarlan & Nolan, 1995).

The other researchers then looked beyond the cost savings and focused their research on overall organizational performance improvements because of outsourcing; namely, system efficiencies, service quality, service reliability, user satisfaction, etc. (Arnett & Jones, 1994; Grover, Cheong, & Teng, 1996; Lacity & Hirschhein, 1993; Lee & Kim, 1999; Loh & Venkatraman, 1995).

In recent years, researchers have focused on the next generation of strategic outsourcing (Insinga & Werle, 2000; Linder et al., 2001), various models of strategic outsourcing and offshoring (Linder et al., 2001; Kumar, 2003), and the effect of strategic outsourcing on organization performance (Elmuti, 2003). The drivers for strategic outsourcing are to cut cost (Bowers, 1990; Greer, Youngblood, & Gray, 1999; Gupta & Zheuder, 1994), increase capacity, improve capacity, improve quality (Kotabe, Murray, & Javalugi, 1998; Lau & Hurley, 1997), increase profitability and productivity (Sinderman, 1995), improve financial performance (Crane, 1999), lower innovation costs and risks (Quinn, 2000), and improve organizational competitiveness (Lever, 1997; Sharpe, 1997; Steensma & Corley, 2000).

EVOLUTION OF THEORETICAL FRAMEWORK

The theoretical perspectives used for outsourcing research can be grouped into two major theoretical considerations. These are: (a) economic theories, (b) organizational and strategic theories. The following section provides relevant theories applicable to outsourcing research.

Economic Theories

Traditionally for outsourcing, companies considered make or buy decisions by focusing the comparative costs for the operation. Organizations provide goods and services to markets where they have cost advantages and rely on the marketplace for goods and services in which they have comparative cost disadvantages (Ang & Straub, 1998). Outsourcing is considered from the point of view of transaction cost theory by some researchers. The transaction cost view of the firm, developed by Williamson (1975), argues that decisions are made by analyzing two types of costs: (a) production costs, or the costs of capital, labor, and materials; (b) and transaction costs, or the costs of monitor-

ing, controlling, and managing transactions. Williamson mentioned that outsourcing providers achieved the lower cost because of low wage rates on the offshore facility and by economies of scale by providing similar services to many clients.

In this area, the cost of production or service is easy to calculate. What is more difficult is to calculate the transaction costs, that have been discussed earlier, especially the threats of opportunism being quite high as has been stated by many researchers, including Amundson (1998), possibility of non maintaining confidentiality (Nam, Rajagopalan, Rao, & Chaudury, 1996), and other factors. The possibility of threat of opportunism appears when a company makes a high investment in the transaction infrastructure. The confidentiality issue could be a threat to intellectual property.

However, with the detailed and careful setup and proper implementation of contract between the company and outsourcer helps makes this outsourcing effort successful (Auer, 1993; Cuthbertson, 1995; Halvey & Melby, 1996; McFarlan & Nolan, 1995; Schachtman, 1998; Wildish, 1993).

Organizational and Strategic Theories

With the advancement of technology, the possibility of using outsourcing from organizational and strategic reasons increased dramatically. As critical and core processes were considered for outsourcing, it is researched from the point of view of the resource-based theory, resource dependence theory, and more. Thus, the considerations include not only the costs and savings but also organizational resources, strategic considerations such as competitive advantage, competition, etc. These aspects are covered under the following theoretical considerations.

One cannot generalize these organizational considerations as every business has different internal and external organizational capabilities and environments (Ginsberg & Venkatraman, 1985). However, from the resource management perspective, the two major views/ theories: resource-based view and resource dependence theory.

Resource based view theory

Resource-based view considers firm as a collection of the productive resources, such as physical resources, human resources, and organizational resources. According to this view, the resources become the competitive advantage to the firm when they are valuable, unique, and non-substitutable, and very hard to imitate (Barney, 1991). Here the organizational resources also include the information resources. Information resources are not just data gathering and complex reports, but information systems, which facilitate the information, acquisition, access, and processing (King & Grover, 1991).

Peteraf (1993) provided the resource-based view model, which forms the basis for attaining the sustained competitive advantage. The four basic conditions to achieve competitive advantage are: (a) resource heterogeneity, (b) Ex post limits to competition, (c) Imperfect resource mobility, (d) Ex ante limits to competition.

Thus, the resource-based view assumes that the firms try to maximize their profits through exploiting and developing these resources (Penrose, 1959). Sometimes in order to enhance their competitive advantages and/or add new capabilities, firms may have to look outside the organizational resources and follow the strategies such as outsourcing, alliances and acquisitions (Grant, 1991). This will not only maintain the firm's stock of resources but also augment it to enhance the competitive advantage and broaden the company's strategic opportunities.

Thus, the difference between the transaction cost theory and the resource-based view is the former emphasize more on cost minimization and neglects the value creation aspect of the transaction (Zajac & Olsen, 1993). However, as the resource-based view focuses on profits and competitive advantage, it does consider both the value and the cost sides of the business (Tsang, 2000).

Resource Dependence Theory

While the resource-based view focuses on the internal analysis of the firm from the resource and capabilities point of view, the resource dependency theory focuses on external environment and argues that organizations to some degree depend on some elements of their business environment (Aldrich, 1976). The resource dependence approach can influence the organizational change by the terms under which critical resources are made available to organizations (Aldrich & Pfeffer, 1976; Pfeffer & Salancik, 1978). Therefore, organizations need to strive to minimize their dependence on other organizations for the supply of scarce resources or need to find ways to influence them to make resources available. The resource dependence approach thus argues that organizations need to adopt strategies to secure access to critical resources, to stabilize the relations with the environment, and to enable their survival (Zeithaml & Zeithaml, 1984).

Social/ Relational Exchange Theory

The social/relational exchange theory considerations used by Lee and Kim (1999) argues the limitations of the transaction theory and other economic theories as lack of consideration for analyzing quality of outsourcing relationships. Swinarski, Kishore, and Rao (2004) suggest 'The clients' power and the quality of their partnership with the service provider motivates the IT service provider to comply with the contractual obligations, cooperate with the client, and invest additional resources into the IT outsourcing relationship" (p. 7).

In the fluctuating and dynamic environment, the strategic flexibility is of utmost importance (Young-Ybarra & Wiersma, 1999). From the social exchange theory, trust was found to be positively related to strategic and operational flexibility, while another component of the social exchange theory, dependence, was found to be negatively related to the strategic flexibility of the alliance.

Relational View Theory

Insinga and Werle (2000) used the resource based theory and relational view theory to support the outsourcing. The resource-based view considers that a company's survival depends on the accumulation of resources, which are rare, valuable, and not easy to substitute (Barney, 1991). These resources help companies to achieve the competitive advantage. The relational view theory recognizes that sources of competitive advantage can exist outside the enterprise in its relationships with other firms.

The main difference between tactical and strategic outsourcing is that in tactical outsourcing it is driven by the perspective of a short-term gain and problem-solving mentality, whereas the consideration for strategic outsourcing is more from a company's long-term goals of achieving competitive advantage, reengineering of the processes, focusing on core competencies, etc. There is a major difference in the buyer-supplier relationship as well, as in the strategic outsourcing, the company and the service providers are more like partners.

Even though as per the resource dependence theory, organizations tend to depend on their outsourcing partners for the resources, they can at least guarantee the flow of this external resource to enhance their strategic edge in the marketplace. Accordingly, organizations could capitalize on outsourcing as a strategic tool to provide surrogates to any shortages faced in strategic resources (Al-Qirim, 2003).

However, Insinga and Werle (2000) warned that even though strategic outsourcing is attractive at a managerial level, there could be serious pitfalls as the strategy is pushed to the day-to-day operations level. Outsourcing at the operational level can easily lead to the development of dependencies that create unforeseen strategic vulnerabilities.

PROBLEM DEFINITION

Even though there are many outsourcing success stories and it is proved empirically to cut costs (Bowers, 1990; Greer, Youngblood, & Gray, 1999; Gupta & Zheuder, 1994), the intended benefits have not always

materialized (Hirschheim & Lacity, 2000; Levina & Ross, 2003; Scheier, 1997). In fact, Lever (1997) and Crowley (1999) argue that, while outsourcing service providers identify the success of their approach, they do not identify the failures or problems of their approach as readily. One empirical research done in the late nineties found that only 54% of outsourcing agreements realized expected cost savings (Lacity & Willcocks, 1998). The recent Gartner Dataquest Report in year 2001 claimed that about one of every three outsourcing contracts that focused mainly on cost reductions failed to match expectations (Caldwell, 2002). Moreover, there is evidence that companies are willing to undergo the expense of canceling their contracts and re-building their in-house IS capabilities (Buxbaum, 2002; McDougall, 2002). Thus, there are many success stories as well as many failures in outsourcing initiatives.

Even though there is some empirical research on 'what' is the main reason for failure of the outsourcing, there is no empirical research on 'why' the outsourcing initiatives failed. For example, even though Elmuti (2003) proves the major factor for failure of outsourcing initiative is "fear of job loss or fear of change," his study does not provide information on 'why' this initiative failed. The answer could be in the strategy of the outsourcing initiative as there could be gain in one functional area but there could be a major loss in other aspect of organizational performance, which was not initially considered. Also currently, there is no tool to define the impact of outsourcing on overall organization.

From a strategic perspective, the outsourcing initiative becomes a more complicated decision because of the number of variables and options companies need to consider. These options could be which processes to outsource? Whether to use the outsourcing vendor or use captive offshoring? How to consider outsourcing initiative for a single function v/s the enterprise wide effect?

The current literature on outsourcing identifies a high-level approach to outsourcing but does not provide detailed methodologies (Bender, 1999; Carney, 1997; Foster 1999). In fact, there is very little, if any, academic research on "Captive Offshoring." Captive offshoring is an initiative by an organization to start its own operations in other low cost countries. This is not a new phenomenon, however main reasons of not having much academic reasons could be 1) difficulty in getting the data across the borders to study this phenomenon in detail 2) cost of collecting the information 3) most importantly, there is no business potential to the service providers to pursue research on this off-shoring initiative. There is also little empirical research investigating overall strategic outsourcing performance implications (Klepps & Jones, 1999; Kotabe, Murray, & Javalagi, 1998). Thus, even if outsourcing initiative is proved empirically for function-wide improvements, its overall value addition for the organization is not tested empirically.

CONCLUSION

Even though the value-based approach to outsourcing has been discussed by the few aforementioned researchers, there is no value based model or empirical research to prove this approach for outsourcing. In addition, most of the empirical research, focused on benefits of outsourcing in particular functional area of the organization, provides the methodology to measure outcome of outsourcing initiative after companies are well into outsourcing initiative but there is no research or a tool available for companies to decide on the outsourcing initiative before company get into it.

Therefore, from future research perspective, there is a need to find out the relationship between the "total value" generation from outsourcing initiative and the success or failure of outsourcing initiative(s). There is also need to define a quantitative value-based model for evaluating the overall effect of outsourcing initiatives, which will help companies to calculate the impact of outsourcing on overall organization value before they get into outsourcing. This will sure help reduce number of failures of outsourcing initiatives.

REFERENCES

- Aldrich, H. (1976). Resource dependence and interorganizational relations: Relation between local employment service office and social service sector Organizations. *Administrations and Society*, 7(4), 419-455.
- Aldrich, H. E., & Pfeffer, J. (1976). Environments of organizations. *Annual Review of Sociology*, 2, 79-105.
- Al-Qirim, N. (2003). The strategic outsourcing decision of IT and eCommerce: The case of small businesses in New Zealand. *Journal of Information Technology Cases and Applications*, 5(3), 32-56.
- Amundson, S.D. (1998). Relationships between theory driven empirical research in operations management and other disciplines. *Journal of Operations Management*, 16(4), 341-359
- Ang, S., & Straub, D. (1998). Production and transaction economies and IS outsourcing: A study of the US banking industry. *MIS Quarterly*, 22(4), 535-552.
- Apte, U. (1990). Global outsourcing of information systems and processing services. *The Information Society*, (4), 287-303.
- Arnett, K. P., & Jones, M. C. (1994). Firms that choose outsourcing: A profile. *Information & Management*, 2(4), 179-188.
- Auer, J. (1993). Negotiating a better deal with vendors. *Information Systems Management*, 10(4), 66-74.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Bender, P. (1999). *Cashing in on competition*. Retrieved May 15, 2004, from <http://www.outsourcing-journal.com/dec1999-insight.html>
- Benko, C. (1992). If information system outsourcing is the solution, what is the problem?, *Journal of Systems Management*, 43(11), 32-35
- Bowers, D. J. (1990). The strategic benefit of logistics alliances. *Harvard Business Review*, 68(4), 6-45.
- Buchowicz, B. S. (1991). A process model of make vs. buy decision making: the case of manufacturing software. *IEEE Transactions on Engineering Management*, 38(1), 24-32.
- Buck-Lew, M. (1992). To outsource or not?, *International Journal of Information Management*, 12(1), 3-20.
- Buxbaum, P. (2002). Bringing IT back home. *Computerworld*, 36(31), 38-44.
- Caldwell, B. (2002). 2001 Trends in IT outsourcing delivery, solution development, marketing, sales and alliances. *Gartner Dataquest*. Retrieved November 18, 2004, from <http://www.itclive.com/e-mail/docs/2001trendsoutsourcing.pdf>
- Carney, W. (1997). Outsourcing HR and benefits: Navigating the right course. *Compensation International*, 26(7), 15-23.
- Crane, D. (1999). Renewed focus on financial performance. Retrieved May 15, 2004, from <http://www.outsourcing-journal.com/jan1999-supplierc.html>
- Cuthbertson, G. (1995). Outsourcing: the computer. *Director*, 49(1), 54-64.
- Elmuti, D. (2003). The perceived impact of outsourcing on organizational performance. *Mid- American Journal of Business*, 18(2), 33-42.
- Foster, T.A. (1999). Lessons learned. *Logistics Management and Distribution Journal* 38(4), 67-69.
- Ginsberg, A., & Venkatraman, N. (1985). Contingency Perspectives of organizational strategy: A critical review of the empirical research. *The Academy of Management Review*, 10(3), 421-434.
- Grant, R. M. (1991). Resourced based theory of competitive advantage: Implications of strategy formulation. *California Management review*, 33(3), 114-135.
- Greer, C. R., Youngblood, S. A., & Gary, D. A. (1999). Human resource management outsourcing: The make or buy decision. *Academy of Management Executive*, 13(3), 85-96.
- Grover, V., Cheon, M. J., & Teng, J. T. C. (1996). The effect of service quality and partnership on the outsourcing of information systems functions. *Journal of Management Information System*, 12(4), 89-116.

- Gupta, M., & Zheuder, D. (1994). Outsourcing and its impact on operations strategy. *Production and Inventory Management Journal*, 35(3), 70-76.
- Gupta, U. G., & Gupta, A. (1992). Outsourcing the IS function: Is it necessary for your organization?, *Information Systems Management*, 9(3), 44-50.
- Halvey, J. K., & Melby, B. M. (1996). International outsourcing transactions. *Managing Intellectual Property*, 56, 38-46.
- Hirschheim, R.A., & Lacity, M.C. (2000). The myths and realities of information technology insourcing, *Communications of the ACM*, 43(2), 99-112.
- Insinga, R. C., & Werle, M. J. (2000). Linking outsourcing to business strategy. *The Academy of Management Executive*, 14(4), 58-70.
- King, W. R., & Grover, V. (1991). The strategic use of information resources: An exploratory study. *IEEE Transaction in Engineering Management*, 38(4), 293-305.
- Klepps, R. & Jones, W. (1999). Effectively managing the outsourcing relationships. www.Outsourcing.com/articles/itserve. 8-14.
- Kotabe, M., Murray, J., & Javalagi, R. (1998). Global sourcing of service and market performance: An empirical investigation. *Journal of International Marketing*, 6(4), 10-13.
- Krajewski, L. J., & Ritzman, L. P. (2002). *Operations management: strategy and analysis*. Upper Saddle River, NJ: Prentice Hall.
- Kumar, V. (2003). Transforming for Success. Retrieved on September 21, 2004 from www.eds.com
- Lacity, M. C., & Hirschheim, R. (1993). *Information systems outsourcing: myths, metaphors and realities*. New York: John Wiley & Sons.
- Lacity, M. C., Willcocks, L. P., & Feeny, D. F. (1996). The value of selective IT sourcing. *Sloan Management Review*, 37(3), 13-25.
- Lacity, M. C., & Willcocks, L.P. (1998). An empirical investigation of information technology sourcing practices: lessons from experience. *MIS Quarterly*, 22(3), 363-408.
- Lau, R. S., & Hurley, C. N. (1997). Outsourcing through strategic alliances. *Production and Inventory Management Journal*, 38(2), 52-57.
- Lever, S. (1997). An analysis of managerial motivations behind outsourcing practices in human resources. *Human Resource Planning*, 20(2), 37-41.
- Levina, N., & Ross, J. W. (2003). From the vendor's perspective: exploring the value proposition in it outsourcing. *MIS Quarterly*, 27(3), 331-364.
- Linder, J. C. (2004). Transformational outsourcing, *Supply Management Review*, 8(4), 54-60.
- Linder, J. C., Sawyer, J., & Hartley, A. (2001). *metrics and incentives in outsourcing: driving peak performance*, (pp. 1-9). Chicago: Accenture Institute for Strategic Change.
- Loh, L., & Venkatraman, N. (1992). Determinants of IT outsourcing: a cross-sectional analysis. *Journal of Management Information Systems*, 9, 7-24.
- Loh, L., & Venkatraman, N. (1995). An empirical study of information technology outsourcing: Benefits, risks, and performance implications. *Proceeding of the Sixteenth International Conference on Information Systems*, Amsterdam, 277-288.
- McDougall, P. (2002). New deals may be start of something big. *Information week*, Retrieved November 22, 2004, from <http://www.informationweek.com/story/IWK20021115S0027>
- McFarlan, F. W., & Nolan, R. L. (1995). How to manage an IT outsourcing alliance. *Sloan Management Review*, 36(2), 9-22.
- Nam, K., Rajagopalan, S., Rao, H. R., & Chaudhury, A. (1996). A two-level investigation of information systems outsourcing. *Communications of the ACM*, 30(7), 33-44.
- Penrose, E. T. (1959). *The theory of the growth of the firm*. Oxford: Blackwell.
- Perry, W., & Devinney, S. (1997). Achieving Quality Outsourcing, *Information Systems Management*, 14(2), 23-26.
- Peteraf, M.A. (1993). The cornerstones of competitive advantage: A resource-based, *Strategic Management Journal*, 14 (3), 179-191.
- Pfeffer, J., & Salancik, G. (1978). *The external control of organizations*. New York: Harper and Row.
- Quinn, B. J. (2000). Outsourcing innovation: The new engine of growth. *Sloan Management Review*, 41(14), 13-23.
- Schachtman, N. (1998). Measure success, *InformationWeek*, 706, 103-106.
- Scheier, R. L. (1997). Businesses outsourcing more, but less thrilled with results, *Computerworld*, 31(29), 14-15.
- Sharpe, M. (1997). Outsourcing, organizational competitiveness, and work. *Journal of Labor Research*, 18(4), 535-549.
- Sinderman, M. (1995). Outsourcing gains speed in corporate world. *National Real Estate Investor*, 37(8), 42-50.
- Steensma, K. R., & Corley, K. G. (2000). On the performance of technology-sourcing partnerships: The interaction between partner interdependence and technology attributes. *Academy of Management Journal*, 43(6), 1045-1067.
- Swinarski, M., Kishore, R., & Rao, H. R. (2004). *The effects of power and partnership on application service provider commitment, cooperation, and compliance*. Paper presented at the Hawaii National Conference 2004, Retrieved on November 10, 2004 from <http://csdl.computer.org/comp/proceedings/hicss/2004/2056/08/205680251b.pdf>
- Tsang, E. W. (2000). Transaction cost and resource-based explanations of joint ventures: a comparison and synthesis. *Organizational Studies*, 21(1), 215-242.
- Welch, J. A., & Nayak, P. R. (1992). Strategic sourcing: a progressive approach to the make or buy decision. *IEEE Transactions on Engineering Management Review*, 20(3), 58-63.
- Wildish, N. (1993). Outsourcing IT - Safeguarding your legal interests. *Purchasing and Supply Management*, 12, 30-33.
- Willcocks, L. P., Lacity, M., & Fitzgerald, G. (1995). Information technology outsourcing in europe and the USA: Assessment issues. *International Journal of Information Management*, 15(5), 333-351.
- Williamson, O. (1975). *Markets and hierarchies: analysis and antitrust implications*. New York: Free Press.
- Young-Ybarra, C., & Wiersma, M. (1999). Strategic flexibility in information technology alliances: The influence of transaction cost economics and social exchange theory. *Organization Science*, 10(4), 439- 450.
- Zajac, E. J., & Olsen, C. P. (1993). From transaction cost to transactional value analysis: implications for the study of interorganizational strategies. *Journal of Management Studies*, 30, 131-145.
- Zeithaml, C. P., & Zeithaml, V. A. (1984). Environmental management: Revising the marketing perspective. *Journal of Marketing*, 48(2), 46-53.
- Zhu, Z., Hsu, K., & Lillie, J. (2001). Outsourcing—a strategic move: The process and the ingredients for success. *Management Decision*, 39(5/6), 373-378.

0 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/proceeding-paper/total-value-consideration-outsourcing/32867

Related Content

Requirements Prioritization and Design Considerations for the Next Generation of Corporate Environmental Management Information Systems: A Foundation for Innovation

Matthias Gräuler, Frank Teuteberg, Tariq Mahmoud and Jorge Marx Gómez (2013). *International Journal of Information Technologies and Systems Approach* (pp. 98-116).

www.irma-international.org/article/requirements-prioritization-design-considerations-next/75789

Privacy-Aware Access Control

Eugenia I. Papagiannakopoulou, Maria N. Koukovini, Georgios V. Lioudakis, Nikolaos L. Dellas, Dimitra I. Kaklamani and Iakovos S. Venieris (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 4403-4411).

www.irma-international.org/chapter/privacy-aware-access-control/112882

A Comprehensive Survey on Face Image Analysis

Yu-Jin Zhang (2015). *Encyclopedia of Information Science and Technology, Third Edition* (pp. 491-500).

www.irma-international.org/chapter/a-comprehensive-survey-on-face-image-analysis/112362

Towards Knowledge Evolution in Software Engineering: An Epistemological Approach

Yves Wautelet, Christophe Schinckus and Manuel Kolp (2010). *International Journal of Information Technologies and Systems Approach* (pp. 21-40).

www.irma-international.org/article/towards-knowledge-evolution-software-engineering/38998

SRU-based Multi-angle Enhanced Network for Semantic Text Similarity Calculation of Big Data Language Model

Jing Huang and Keyu Ma (2023). *International Journal of Information Technologies and Systems Approach* (pp. 1-20).

www.irma-international.org/article/sru-based-multi-angle-enhanced-network-for-semantic-text-similarity-calculation-of-big-data-language-model/319039