

# Enterprise Architecture

## *To Business or Not to Business? That Is The Question!*

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Abstract: The concept of enterprise architecture (EA) is widely known in Information Systems (IS) field. Traditionally EA is categorized as an IS issue, focusing mainly on information and communications technology (ICT) aspects. Recently some researchers have insisted that the scholars and practitioners should pay more attention to the business aspects EA. This scoping study seeks to find out the current status of EA research in Management Science (MS) field. For this purpose, we reviewed the top MS journals to find out if and how the concepts related to EA are researched by MS scholars. The results revealed that EA concepts are researched by MS scholars and reported in top MS literature. However, although conceptually same, the vocabulary used in EA and MS fields are different.

## 1 INTRODUCTION

Enterprise Architecture (EA) was introduced in 1980's and has been in the interest of scholars and practitioners ever since. The seminal article by John Zachman (1987) introduced us a framework for information systems architecture. Since then, EA has been seen as an Information Systems (IS) issue (Gregor, Hart, & Martin, 2007). EA frameworks, such as TOGAF (The Open Group, 2009), has typically four layers; business, information, information systems, and technology. The business layer includes concepts such as business services and business processes; issues typically studied in Management Sciences (MS). However, it is very common that EA is used merely to *describe the business*, not to manage or develop it. Recently some scholars have insisted that EA should more strongly pay attention to areas outside ICT, including business management (Rahimi, Götze, & Møller, 2017). A recent study demonstrated that the term "enterprise architecture" does not appear in the studies published in the top MS journals (Syynimaa, 2017). This implies that either MS scholars are not studying anything related to EA or that they are using different terminology. The motivation for this paper is to find out whether the EA related concepts are studied in MS field.

Let us first define the concepts and terms used in this paper. We define *enterprise architecture* as a formal description of the current and future state of the enterprise, and a managed change from the current state towards a desired future state (Syynimaa, 2015). *Formal description* means that the descriptions are produced using a pre-defined notation agreed to be used in the enterprise. For this purpose, notations such as ArchiMate (Jonkers et al., 2004) can be used. *Managed change* refers to an endeavour where the enterprise is deliberately changed from the current state to the planned future state. By *enterprise*, we refer to a social organization defined by its boundaries (Syynimaa, 2017). These boundaries are not fixed and depend on what we choose to include to the enterprise, as illustrated in Figure 1. Thus, besides being a social organisation, it is also a *system* of social organisations. If we follow Boulding's (1956) definition, the system is located in its environment. The *environment* can be defined as uncontrollable variables residing outside enterprise's boundaries (Rahimi et al., 2017).

The rest of the paper is organized as follows. In the next section, we will briefly summarize findings from our previous literature review on EA. In the third section, we introduce our research method and walk through the research process. The results of the

literature review are presented in the fourth section, followed by a discussion.

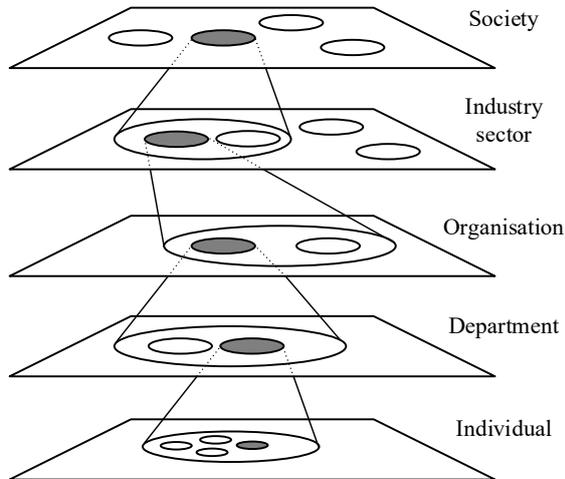


Figure 1: Hierarchical Levels of Enterprise Architecture (adapted from Syynimaa, 2017).

## 2 ENTERPRISE ARCHITECTURE IN IS AND MS LITERATURE

In our previous paper (Syynimaa, 2017) we studied the underpinning theories of enterprise architecture. As part of that study, we conducted a literature review including the leading IS and MS journals. We focused on leading journals because the state-of-the-art of any discipline is likely to be found from the top journals (Webster & Watson, 2002). In the review, we searched top IS journals ranked by Association of Information Systems (AIS, 2011) between 2000 and 2016 for the term “enterprise architecture”. The results are presented in Table 1 (rows 1 to 8). As the results indicate, we found 14 EA articles from the top IS journals. We also decided to include MISQE in our review, and, to our surprise, we found 10 EA articles. This encouraged us to include top MS journals to our review as ranked by Association of Business Schools (ABS, 2010). Results are presented in Table 1 (rows 10 to 16). As it can be seen, unfortunately, we did not find any EA articles from top MS journals.

As mentioned earlier, this led us to a conclusion that EA is still seen purely as an IS issue or that different terminology is used by MS scholars.

## 3 RESEARCH METHOD

Enterprise architecture as a discipline is relatively young when compared for instance to IS and MS.

Table 1: EA Literature on top IS and MS Journals 2000-2006.

Journal	# of EA articles
1. European Journal of Information Systems	6
2. Information Systems Journal	3
3. Information Systems Research	0
4. Journal of AIS	2
5. Journal of Information Technology	1
6. Journal of MIS	1
7. Journal of Strategic Information Systems	1
8. MIS Quarterly	0
9. MIS Quarterly Executive	10
10. Academy of Management Journal	0
11. Academy of Management Review	0
12. Administrative Science Quarterly	0
13. Journal of Management	0
14. British Journal of Management	0
15. Journal of Management Studies	0
16. Harvard Business Review	0
Total	24

When conducting a literature review on young discipline, it is recommended to include literature from other disciplines (Webster & Watson, 2002). As the results of the previous section revealed, the term “enterprise architecture” is not used in MS literature. Therefore, we need to consider other search terms to find possibly relevant literature.

The concept of enterprise architecture has two components; a description of an enterprise and a managed change between the current and future states of the enterprise. Thus, it would be natural to use these constituent concepts (i.e. description, change, and enterprise) as search terms. For better coverage, we used Oxford Dictionaries (2010) to find synonyms for each term. The concepts and search terms are listed in Table 2.

We used EBSCOhost Business Source Elite to search each top MS journals listed in Table 1. The search had two rounds, one for each search term sets. The first set contains the description search terms and enterprise terms, and the second one change search terms and enterprise terms. In the first round, we searched for “(TI (<description>)) AND (TI (<enterprise>))” where <description>

Table 2: Literature Review Concepts and Search Terms.

Concept	Search terms	
description	representation delienation characterization model	depiction rendition description
change	alter adapt improve convert recast reshape remake reorganize transform	adjust turn modify revise reform redesign remodel refine
enterprise	business firm enterprise organization bureau strategy	work company venture corporation office

concept, and <enterprise> to all search terms of the enterprise concept. On the second round we searched for “(TI (<change>)) AND (TI (<enterprise>))”, where <change> refers to all search terms of the change concept.

In total, 145 articles were found. After reading the abstracts and removing out-of-scope articles, 86 articles remained. The full list of the articles can be seen in Appendix. The number of articles per journal is summarised in Table 3.

## 4 RESULTS

### 4.1 Statistics

We categorized the publications by their type (description and change) and by their focus. For the focus, we used the hierarchical levels of enterprise, as illustrated in Figure 1. The summary is presented in Table 4.

Most of the articles (81/86) were related to descriptions of the enterprise, while only five was about the change. If we study the findings by the hierarchical level, we can see that the focus of the most of articles (73/86) was the organisation.

The timescale of the articles was from 1930 to 2017. As it can be seen in Figure 2, majority of articles were published after 1970 and a peak year (8 articles) was 2011.

Table 3: Literature Review Publications.

Journal	# of articles
1. Academy of Management Journal	10
3. Academy of Management Review	24
3. Administrative Science Quarterly	5
4. Journal of Management	11
5. British Journal of Management	7
6. Journal of Management Studies	11
7. Harvard Business Review	18
Total	86

Table 4: Literature Review Summary.

Level	Publications		
	Description	Change	Total
Society	3	1	4
Industry sector	6	0	6
Organisation	69	4	73
Department	0	0	0
Individual	3	0	3
Total	81	5	86

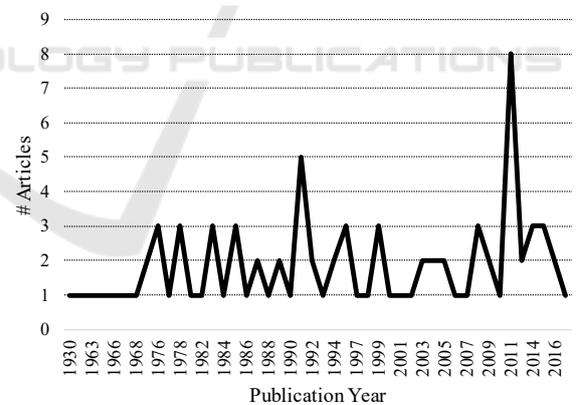


Figure 2: Published Articles per Year.

### 4.2 Findings

As the results revealed, the majority of the articles found from top MS journals were about modelling organisations. For instance, Zott, Amit & Massa (2011) provided a review of recent developments and future research of business models, Ovans (2000) discussed the patentability of business models, and Foss & Saebi (2017) provided a review of 15 years of business model innovation. The *business model* can

be simply defined as a plan how an organisation makes money (Lewis, 1999). Although it is not called a business architecture, that is what the business model in essence is.

Models for organisations have been crafted long before the introduction of enterprise architecture. For instance, Nutt (1976) presented six decision-making models to assist with organisational decision making, and Beach and Mitchell (1978) modelled a process how decision makers choose a strategy for the organisation. The question how to model organisations goes even further back. For instance, Brown (1967) introduced various techniques how to model organisations.

Choosing a strategy to an organisation is conceptually same than choosing or creating a future state business architecture. Similarly, executing the strategy (*i.e.*, change) is conceptually same than the managed change from the current state to the future state of the organisation. Therefore, it was a surprise that there were only five articles related to change. It was assumed that executing the change would be in the more important role in MS journals. The low number of change articles can partly be explained by the categorisation used in this paper. For instance, if the article proposed a new way to execute a change, that is actually a new model of performing your job, and therefore categorised as a model type of article.

The role of information and communications technology (ICT) also seems to be an important issue in MS literature. For instance, Dewett and Jones (2001) discussed the role of ICT in organizations. According to their findings, ICT effects enterprise's strategic outcomes, efficiency and innovation. This is hardly a surprise to IS scholars but may indicate the rising understanding and interest of ICT among MS scholars.

The literature review, including the articles above, clearly indicates that although the term enterprise architecture is not present in MS journals and likely not known to MS scholars, the constituent components of enterprise architecture are. The rising importance of ICT and the need to quickly adapt to the changing environment calls for more comprehensive planning, taking into account the whole organisation and its components. This is where we believe enterprise architecture could help.

## 5 DISCUSSION

### 5.1 Conclusions

In this scoping study, we researched management

science (MS) literature to find out whether the constituent concepts of enterprise architecture (EA) are researched by MS scholars. As the results revealed, these concepts, namely a description and a managed change of an enterprise, are indeed researched by MS scholars. When MS scholars are studying the enterprise's plans for the future, they do not call them future state architecture descriptions but business models and strategies. Nevertheless, conceptually these are same things, which indicates that there is a potential terminology issue among IS and MS scholars. This is problematic as it may widen the gap between business and ICT.

### 5.2 Implications

The evidence from the literature review shows that the concepts of enterprise architecture are researched also by MS scholars. Authors would like to encourage EA scholars to expand the scope of EA outside of traditional ICT and IS thinking. We believe that both fields would greatly benefit from the future cooperation.

### 5.3 Limitations

This study is a scoping study and, as such, is touching only a limited portion of available MS literature. The literature review did not cover, for instance, scientific conferences or books. However, we believe that by systemically researching the top MS literature gave us a reasonable view of the current state of enterprise architecture research in MS field.

### 5.4 Directions for Future Research

The limitations mentioned above led to the first suggestion for further research. A more comprehensive study of MS literature would likely give a better view of how EA research is currently evolving in MS field. Also, it would help to confirm our results.

The second direction for future research would be to study the terminology used by EA and MS scholars. It would be interesting to know how different the used terminology of conceptually same thing is, and does the differences affect the cooperation.

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- Dewett, T., & Jones, G. R. (2001). The role of information technology in the organization: a review, model, and assessment. *Journal of Management*, 27(3), 313-346.
- Foss, N. J., & Saebi, T. (2017). Fifteen Years of Research on Business Model Innovation. *Journal of Management*, 43(1), 200-227. doi:10.1177/0149206316675927
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## APPENDIX: LITERATURE REVIEW ARTICLES

Article	Type		Focus			
	Description	Change	Individual	Organisatio	Industry	Society
Anderson, R. L., & Terborg, J. R. (1988). Employee Beliefs and Support for a Work Redesign Intervention. <i>Journal of Management</i> , 14(3), 493-503.	X			X		
Andrew, G. (1965). An Analytic System Model for Organization Theory. <i>Harvard Business School Working Knowledge</i> , 8(3), 190-210. doi:10.2307/254787	X			X		
Arogyaswamy, K., Barker, I. I. V. L., & Yasai-Ardekani, M. (1995). FIRM TURNAROUNDS: AN INTERGRATIVE TWO-STAGE MODEL. <i>Journal of Management Studies</i> , 32(4), 493-525.	X			X		
Barney, J. (1991). Special Theory Forum: The Resource-Based Model of the Firm: Origins, Implications, and Prospects. <i>Journal of Management</i> , 17(1), 97.	X			X		
Bartlett, D. (2003). Management and Business Ethics: A Critique and Integration of Ethical Decision-making Models. <i>British Journal of Management</i> , 14(3), 223-235. doi:10.1111/1467-8551.00376	X			X		
Beach, L. R., & Mitchell, T. R. (1978). A Contingency Model for the Selection of Decision Strategies. <i>Academy of Management Review</i> , 3(3), 439-449. doi:10.5465/AMR.1978.4305717	X			X		
Behling, O. (1980). The Case for the Natural Science Model for Research in Organizational Behavior and Organization Theory. <i>Academy of Management Review</i> , 5(4), 483-490. doi:10.5465/AMR.1980.4288944	X			X		
Berman, S. L., Wicks, A. C., Kotha, S., & Jones, T. M. (1999). DOES STAKEHOLDER ORIENTATION MATTER? THE RELATIONSHIP BETWEEN STAKEHOLDER MANAGEMENT MODELS AND FIRM FINANCIAL PERFORMANCE. <i>Harvard Business School Working Knowledge</i> , 42(5), 488-506. doi:10.2307/256972	X			X		
Betton, J., & Dess, G. G. (1985). The Application of Population Ecology Models to the Study of Organizations. <i>Academy of Management Review</i> , 10(4), 750-757. doi:10.5465/AMR.1985.4279098	X			X		
Bock, A. J., Opsahl, T., George, G., & Gann, D. M. (2012). The Effects of Culture and Structure on Strategic Flexibility during Business Model Innovation. <i>Journal of Management Studies</i> , 49(2), 279-305. doi:10.1111/j.1467-6486.2011.01030.x	X			X		
Bogner, W. C., & Thomas, H. (1993). THE ROLE OF COMPETITIVE GROUPS IN STRATEGY FORMULATION: A DYNAMIC INTEGRATION OF TWO COMPETING MODELS. <i>Journal of Management Studies</i> , 30(1), 51-67.	X				X	
Brown, W. B. (1967). Model-Building and Organizations. <i>Harvard Business School Working Knowledge</i> , 10(2), 169-178. doi:10.2307/254635	X			X		
Buckland, R. (2009). Private and Public Sector Models for Strategies in Universities. <i>British Journal of Management</i> , 20(4), 524-536. doi:10.1111/j.1467-8551.2008.00593.x	X			X		
Burgelman, R. A. (1983). A Model of the Interaction of Strategic Behavior, Corporate Context, and the Concept of Strategy. <i>Academy of Management Review</i> , 8(1), 61-70. doi:10.5465/AMR.1983.4287661	X					
Burgelman, R. A. (1983). A Process Model of Internal Corporate Venturing in the Diversified Major Firm. <i>Administrative science quarterly</i> , 28(2), 223-244.	X			X		
Casadesus-Masanell, R., & Ricart, J. E. (2011). How to Design A Winning Business Model. <i>Harvard Business Review</i> , 89(1/2), 100-107.	X					
Casadesus-Masanell, R., & Tarziján, J. (2012). When One Business Model Isn't Enough. <i>Harvard Business Review</i> , 90(1/2), 132-137.	X			X		
Chaffee, E. E. (1985). Three Models of Strategy. <i>Academy of Management Review</i> , 10(1), 89-98. doi:10.5465/AMR.1985.4277354	X			X		
Chandler, D., & Hwang, H. (2015). Learning From Learning Theory: A Model of Organizational Adoption Strategies at the Microfoundations of Institutional Theory. <i>Journal of Management</i> , 41(5), 1446-1476. doi:10.1177/0149206315572698	X					
Charan, R. (1991). How Networks Reshape Organizations--For Results. <i>Harvard Business Review</i> , 69(5), 104-115.	X			X		
Cliffe, S. (2011). When Your Business Model Is in Trouble. <i>Harvard Business Review</i> , 89, 96-98.	X			X		
Cuervo-Cazurra, A., & Dau, L. A. (2009). PROMARKET REFORMS AND FIRM PROFITABILITY IN DEVELOPING COUNTRIES. <i>Harvard Business School Working Knowledge</i> , 52(6), 1348-1368. doi:10.5465/AMJ.2009.47085192	X					X

Article	Type		Focus			
	Description	Change	Individual	Organisatio	Industry	Society
Daft, R. L., & Weick, K. E. (1984). Toward a Model of Organizations as Interpretation Systems. <i>Academy of Management Review</i> , 9(2), 284-295. doi:10.5465/AMR.1984.4277657	X			X		
Dewett, T., & Jones, G. R. (2001). The role of information technology in the organization: a review, model, and assessment. <i>Journal of Management</i> , 27(3), 313-346.	X			X		
Dyck, B., & Starke, F. A. (1999). The Formation of Breakaway Organizations: Observations and a Process Model. <i>Administrative science quarterly</i> , 44(4), 792-822.	X			X		
Eddy, W. B., Boyles, B. R., & Frost, C. F. (1968). A Multivariate Description Of Organization Process. <i>Harvard Business School Working Knowledge</i> , 11(1), 49-61. doi:10.2307/255196	X			X		
Elangovan, A. R. (1995). MANAGERIAL THIRD-PARTY DISPUTE INTERVENTION: A PRESCRIPTIVE MODEL OF STRATEGY SELECTION. <i>Academy of Management Review</i> , 20(4), 800-830. doi:10.5465/AMR.1995.9512280022	X			X		
Eyring, M. J., Johnson, M. W., & Nair, H. (2011). New Business Models In Emerging Markets. <i>Harvard Business Review</i> , 89(1/2), 88-95.	X			X		
Foss, N. J., & Saebi, T. (2017). Fifteen Years of Research on Business Model Innovation. <i>Journal of Management</i> , 43(1), 200-227. doi:10.1177/0149206316675927	X			X		
French, W. (1963). Process Vis-a-Vis Systems: Toward a Model of the Enterprise and Administration. <i>Harvard Business School Working Knowledge</i> , 6(1), 46-57. doi:10.2307/254876	X			X		
Friesen, P. H., & Miller, D. (1986). A MATHEMATICAL MODEL OF THE ADAPTIVE BEHAVIOR OF ORGANIZATIONS. <i>Journal of Management Studies</i> , 23(1), 1-25.	X			X		
Gaddis Ross, D. (2014). TAKING A CHANCE: A FORMAL MODEL OF HOW FIRMS USE RISK IN STRATEGIC INTERACTION WITH OTHER FIRMS. <i>Academy of Management Review</i> , 39(2), 202-226. doi:10.5465/amr.2012.0107	X			X		
Girotra, K., & Netessine, S. (2011). How to Build Risk into Your Business Model. <i>Harvard Business Review</i> , 89(5), 100-105.	X			X		
Girotra, K., & Netessine, S. (2014). four paths to business model innovation. <i>Harvard Business Review</i> , 92(7/8), 96-103.	X			X		
Golembiewski, R. T. (1966). Personality and Organization Structure: Staff Models and Behavioral Patterns. <i>Harvard Business School Working Knowledge</i> , 9(3), 217-232. doi:10.2307/255120	X			X		
Gong, Y. (2003). Toward a Dynamic Process Model of Staffing Composition and Subsidiary Outcomes in Multinational Enterprises. <i>Journal of Management</i> , 29(2), 259-280.	X			X		
Govindarajan, V., & Trimble, C. (2011). The CEO's Role In Business Model Reinvention. <i>Harvard Business Review</i> , 89(1/2), 108-114.	X			X		
Gragg, C. I. (1939). REFORM LAW AND BUSINESS STATESMANSHIP. <i>Harvard Business Review</i> , 17(4), 414.	X					X
Griffin, R. W. (1991). RESEARCH NOTES. EFFECTS OF WORK REDESIGN ON EMPLOYEE PERCEPTIONS, ATTITUDES, AND BEHAVIORS: A LONG-TERM INVESTIGATION. <i>Harvard Business School Working Knowledge</i> , 34(2), 425-435. doi:10.2307/256449	X			X		
Gyllenhammar, P. G. (1977). How Volvo adapts work to people. <i>Harvard Business Review</i> , 55(4), 102-113.	X			X		
Hanan, M. (1974). Reorganize your company around its markets. <i>Harvard Business Review</i> , 52(6), 63.	X			X		
Hansen, J. R., & Jacobsen, C. B. (2016). Changing Strategy Processes and Strategy Content in Public Sector Organizations? A Longitudinal Case Study of NPM Reforms' Influence on Strategic Management. <i>British Journal of Management</i> , 27(2), 373-389. doi:10.1111/1467-8551.12157	X				X	
Harrison, J. R., & Carroll, G. R. (1991). Keeping the Faith: A Model of Cultural Transmission in Formal Organizations. <i>Administrative science quarterly</i> , 36(4), 552-582.	X			X		
Heinen, J. S., & Jacobson, E. (1976). A Model of Task Group Development in Complex Organizations and a Strategy of Implementation. <i>Academy of Management Review</i> , 1(4), 98-111. doi:10.5465/AMR.1976.4396620		X		X		
Hillman, A. J., & Hitt, M. A. (1999). CORPORATE POLITICAL STRATEGY FORMULATION: A MODEL OF APPROACH, PARTICIPATION, AND STRATEGY DECISIONS. <i>Academy of Management Review</i> , 24(4), 825-842. doi:10.5465/AMR.1999.2553256	X			X		
Hofmann, D. A., & Gavin, M. B. (1998). Centering Decisions in Hierarchical Linear Models: Implications for Research in Organizations. <i>Journal of Management</i> , 24(5), 623-641.	X			X		

Article	Type		Focus			
	Description	Change	Individual	Organisatio	Industry	Society
Hoy, F., & Hellriegel, D. (1982). The Kilmann and Herden Model of Organizational Effectiveness Criteria for Small Business Managers. <i>Harvard Business School Working Knowledge</i> , 25(2), 308-322. doi:10.2307/255993	X			X		
Hunt, B. C. (1930). RECENT ENGLISH COMPANY LAW REFORM. <i>Harvard Business Review</i> , 8(2), 170-183.		X				X
Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). Reinventing Your Business Model. (cover story). <i>Harvard Business Review</i> , 86(12), 50-59.	X			X		
Kahn, W. A., & Kram, K. E. (1994). AUTHORITY AT WORK: INTERNAL MODELS AND THEIR ORGANIZATIONAL CONSEQUENCES. <i>Academy of Management Review</i> , 19(1), 17-50. doi:10.5465/AMR.1994.9410122007	X			X		
Kavadias, S., Ladas, K., & Loch, C. (2016). THE TRANSFORMATIVE BUSINESS MODEL. <i>Harvard Business Review</i> , 94(10), 90-98.	X			X		
Kehr, H. M. (2004). INTEGRATING IMPLICIT MOTIVES, EXPLICIT MOTIVES, AND PERCEIVED ABILITIES: THE COMPENSATORY MODEL OF WORK MOTIVATION AND VOLITION. <i>Academy of Management Review</i> , 29(3), 479-499. doi:10.5465/AMR.2004.13670963	X		X			
Kirkman, B. L., & Shapiro, D. L. (1997). THE IMPACT OF CULTURAL VALUES ON EMPLOYEE RESISTANCE TO TEAMS: TOWARD A MODEL OF GLOBALIZED SELF-MANAGING WORK TEAM EFFECTIVENESS. <i>Academy of Management Review</i> , 22(3), 730-757. doi:10.5465/AMR.1997.9708210724	X			X		
Klein, H. J. (1989). An Integrated Control Theory Model of Work Motivation. <i>Academy of Management Review</i> , 14(2), 150-172. doi:10.5465/AMR.1989.4282072	X		X			
Klein, J. I. (1989). PARENTHETIC LEARNING IN ORGANIZATIONS: TOWARD THE UNLEARNING OF THE UNLEARNING MODEL. <i>Journal of Management Studies</i> , 26(3), 291-308.	X			X		
Klein, J. I. (1990). Feasibility Theory: A Resource-Munificence Model of Work Motivation and Behavior. <i>Academy of Management Review</i> , 15(4), 646-665. doi:10.5465/AMR.1990.4310871	X		X			
Kotha, R., Kim, P. H., & Alexy, O. (2014). TURN YOUR SCIENCE INTO A BUSINESS. <i>Harvard Business Review</i> , 92(11), 106-114.		X		X		
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	Description	Change	Individual	Organisatio	Industry	Society
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