The role of IT in patterned interactions among key management strategies : implications for ITBV

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1. Introduction & Motivation

One of the important roles of Information Technology (IT) is to act as an enabler to enhance organizational performance by augmenting many value-adding activities in organizations [1]. It can be used as a game changer and has been rapidly adopted [2]. However, the nature of how IT and other resources interact is still "largely unknown" [3] due to casual complexity that is insufficient to be solved by traditional econometric based empirical methods [4].

Project Aim

To propose a model of simulating the complex interdependencies between IT and complementary organisational practices.

2. Research Questions

- How does the role of IT affect the performance of the firm and what impact do they have?
  - Under different organizational design (i.e. different interaction pattern between management strategy and IT)
  - Under different interaction volume?
- How to best deploy IT?
- Does IT give the firm better flexibility without consequences (e.g. decrease in performance)?
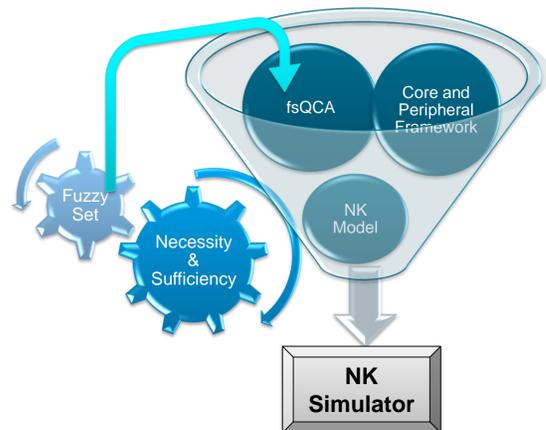
3. Methodology – NK Simulator

Figure 1: Concepts behind the NK Simulator

NK Model : simulate the interactions of multiple elements to re-create or predict the appearance of complex phenomena [5] by treating organizations as complex adaptive systems.

Causal Core Periphery Framework: Each resource including IT can take turn to play the role of "core" and "peripheral" element in the organisation in which they respectively represent "essential " elements that contribute to the success of the firm and elements that are "less important" to the success of the firm [6]

Systems Fitness (fsQCA) : Fuzzy set Qualitative Comparative Analysis [7] is used to measure the systems fit amongst resources by examining whether the casual set is consistently a subset of the cases with positive outcome and is calculated as follow:

$$Consist\ (X_i \leq Y_i) = \frac{\sum_i m_{xi} \cap yi}{\sum_i m_{xi}}$$

where

- X = causal conditions
- $m_{xi} \cap yi$ = membership score of a firm i in the intersection of sets X and Y.
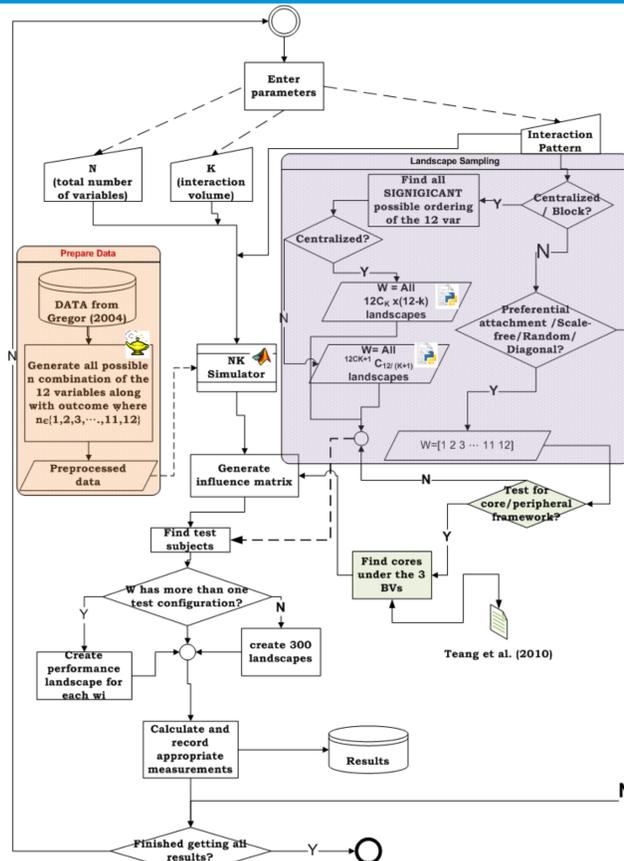- m_{xi} = membership score of a firm in the set X.

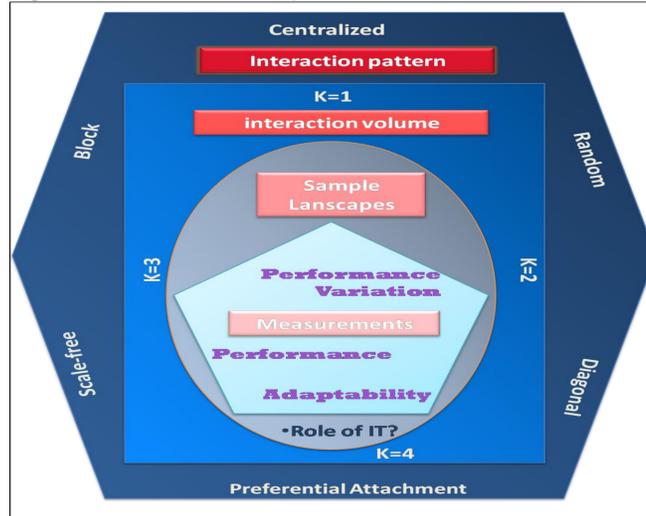Figure 2 Flow chart to explain how the simulator works

Figure 3: Examination of Data under different angle/ context

4. Case Study: IT and Work Practices

We fed the NK simulator with the resource bundle of IT and 11 complementary resources shown in figure 4., collected by [8] in 2004.
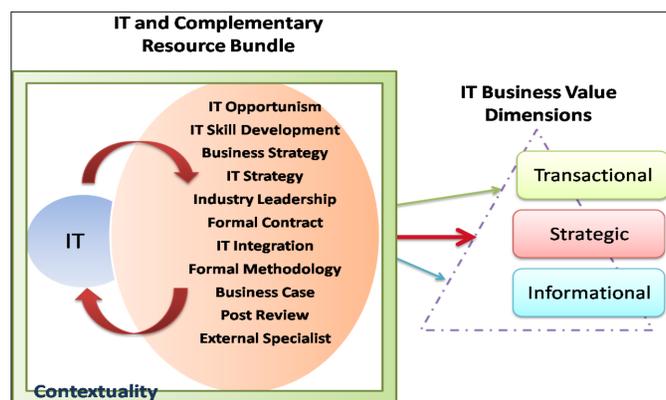

Figure 4: Elements examined in this study

Results

Substantial variation in the return to IT
When IT influences all other elements within the firm, the resulting best performance is the greatest of all other landscapes with the minimum performance being the lowest, leading to the greatest variation in performance. Moreover, the performance variation will increase with high interaction volume. [fig. 5 &6]

IT Skill Development and IT opportunism keep return to IT more consistent
When IT is partnered with these two complementary resources to act as multi-cores,

Figure 5: Performance of Landscapes under k=1 interaction vol.ume when the underlying interaction pattern is "centralized"
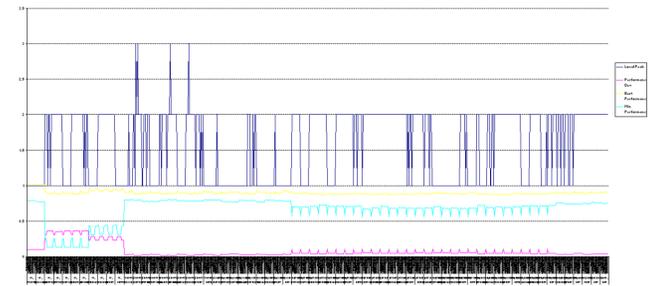

Figure 6: Performance of Landscapes under k=2 interaction vol.ume when the underlying interaction pattern is "centralized"

the variation in performance decreases significantly regardless of interaction volume. [fig.6]

Implementing IT does not directly given firm more flexibility.

Despite common belief that IT is "generic" , its effect are very specific such that there are only less than handful of ways to structure IT in an advantageous way. However, this study has found that if IT is to play an peripheral role in firm, under 2 core elements environment, the firm will benefit the most in Using the 3 different organisational designs:
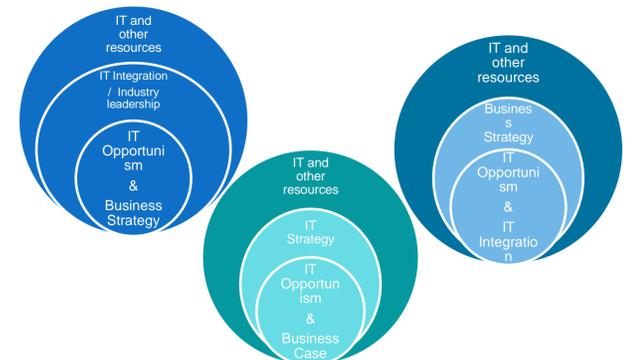

Figure 7: The 3 advantageous core, partial core and peripheral organizational design; in terms of sustainable performance and adaptability of the firm

6. Contributions

- For practitioners – make informed , context-specific IT investments decisions such as the identification of appropriate role(s) IT can play within firm and the most favorable organisational design for the adoption of IT by either referring to general phenomenon

- For researchers – it offers a new analytical dimension of studying inter-dependency between elements/agents within a complex system.

7. References

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[5] Rivkin, J. W., & Siggelkow, N. (2007). Patterned Interactions in Complex Systems: Implications for Exploration. Management Science, 53(7), 1068-1085. doi: 10.1287/mnsc.1060.0626.
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