

ECCS

European Conference on Complex Systems

EUROPEAN CONFERENCE ON COMPLEX SYSTEMS

Investigating relation between complexity and performance: a case study

De Toni A. F. (University of Udine)

Pessot E. (University of Udine)

Candussio F. (University of Udine)

Boem M. (University of Udine)

22nd-26th September 2014
Lucca (Italy)

INVESTIGATING RELATION BETWEEN COMPLEXITY AND PERFORMANCE: A CASE STUDY IN OPERATIONS

(EXTENDED ABSTRACT)

Alberto Felice De Toni¹, Elena Pessot¹, Fabio Candussio¹, Marco Boem¹

¹ University of Udine - Department of Electrical, Management and Mechanical Engineering

Keywords: Complexity measure, performance, operations, case study

INTRODUCTION

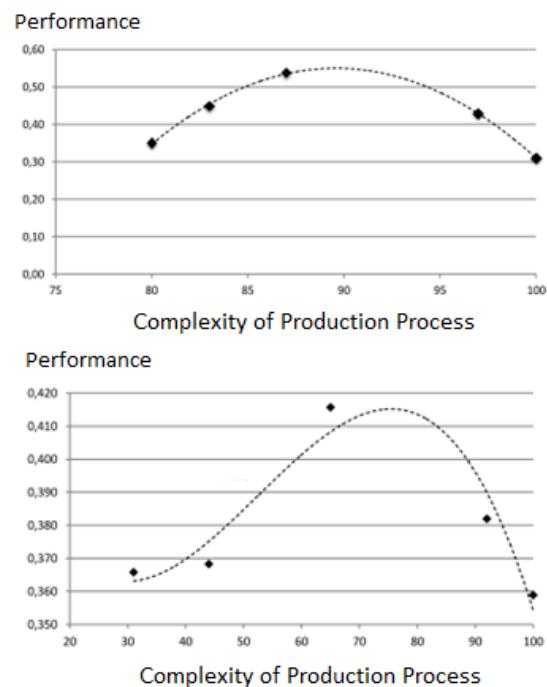
The dynamic competitive environment forces companies to operate beyond their capacity, aiming at conflictive objectives – increasing product differentiation and reaching economies of scale – that require continuous investments, in a spiral of management costs and complexity growth. Thus emerges the need to identify an organisational structure of production process that is consistent with the assessed level of external complexity and flexible enough to reach adequate level of performance.

The understanding of how complexity affects manufacturing performance still lacks of a well-grounded literature support; some authors found an inverted U-shaped relation between total internal complexity and firm performance at strategic-organisational level (Anderson *et al.*, 2006; Collinson, 2011; Collinson and Jay, 2012; Davis *et al.*, 2009; Eisenhardt and Sull, 2001).

Grounding on manufacturing complexity management literature, this paper investigates the shape of the complexity curve in operations, and in particular the production configuration that maximise performance in relation to complexity. The company analysed in the case study is Alf Group Spa, an Italian leader of the furniture industry. From a strategic point of view, the company faced initially the growth of environmental complexity by increasing the variety with different product options, production logics and markets. Aiming to recover internal efficiency, Alf then started a process of internal simplification by reducing the variety (standardisation) and introducing modularity in production flows.

In this paper each production configuration is described by a measure of complexity, defined by coordination between production routings, and a measure of performance, that reflects the fitness of the analysed configuration in relation with general company strategies. The

graphs below, that represent the figures obtained for two different production processes,



demonstrate that also at operations level performance increase as complexity increases till a maximum level, and after that start to decrease, drawing an inverted U-shaped curve.

Figure – Complexity-performance measured relation

CONCLUSIONS

The analysed case study tested the existence of the complexity curve in operations, as representative relation between internal manufacturing complexity and performance. In front of growing external complexity, these findings are a practical evidence for companies to identify the configuration of production process that maximises performance. It was found that the best organisational configuration is located at an intermediate level of

complexity, between minimum and maximum level of coordination of production routings.

REFERENCES ARE AVAILABLE UPON REQUEST