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## Coordinating dispersed product development processes: A contingency perspective of project design and modelling

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### ABSTRACT

Managing worldwide supply pipeline operations concerns coordination and control of every step of the chain process starting from raw material sourcing, production, finally to distribution of market-specific items in retail places, all the way from product value inception and engineering, through manufacturing design, to the worldwide logistic planning. From systems perspectives, their relationships and interactions determine the overall performance. Coordinating such systems is very human-inclusive, characterised by abstract, ill-structured information interchange among well-partitioned expert groups. In this paper we documented the experience and implications of managing and modelling product development activities from a contingent perspective of interdependence. In our investigations amongst six international fashion corporations, crucial activity tasks in different countries were analyzed and evaluated within the context of launching schedule-driven fashion products. At the outset, we present the problem context, the issues arising from coordinating product development systems, and the approach we use to deal with the issues, i.e. modelling and manipulating the process interaction. We put forth a dependency-based process performance simulation, the related approach of data capture and the attribute constructs to represent the interactivity relationship. Finally, we discuss the computation process and evaluation strategy, which is indeed inspired by today's simulation-based optimization concepts. An effective GA heuristics is duly implemented.

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### 1. Introduction

This research examines the experience and implication of managing and modeling dispersed product development activities in the international fashion supply businesses. It encompasses an empirical investigation, which is based on the contingency perspective of organizational interdependence and restructuring; wherein the appropriate settings of bureaucracy and the respective interdependent process integration have to be

established, subject to the kinds of uncertain innovation task and market environments (Clark and Fujimoto, 1991; Kusiak and Wang, 1993b; Levitt et al., 1999; Pennings, 1975; Victor and Blackburn, 1987). Pertaining to the contingency management needs for coordinating and restructuring organizational process, we posit activity task interdependence as a management contingency variable to model overall performance of a chained activity process. Interdependence is viewed as a vital part of systems that determines how organization activities cooperate and avail themselves to cope with changing market demand. Logically thought, some forms and patterns of activity interaction have to be preferred and perceived leading to better competitive and performance

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advantages. However, organization interactions are subtly intractable and carry types of intricate social and psychological attachments (Van de Ven and Walker, 1984; Uzzi, 1997).

Notably, this contingency-viewed activity tasks are contextually dynamic and require teams to appreciate their distinctive objectives and constraints to proceed their activities in highly autonomous ways. Yet the action of theirs are interdependent, each relying upon an understanding of how the other teams are presumed to respond to the common environment concurrently. However, in reality, seldom single functional entity or enterprise is able to perceive all the perspectives throughout all phases of a business cycle, especially for today's marketplaces in which products are developed, sourced and distributed throughout worldwide supply pipelines (Abernathy et al., 1995; To et al., 2002). In this paper, the contingency-based research focuses particularly on a methodology that continually improves information flow process structure among complex, interdependent and geographically dispersed product development activities. In order to investigate the pertinent issues of integrating and managing such activities, the authors researched the activity workflow process structures in general and analyzed how the information was processed and managed among the activities in particular, in the context of global fashion businesses. To allow the generalization of empirical findings about activity workflow structure for product development, a flowchart model of activity processes has been established, as shown in Fig. 1.

The flowchart corresponds with the apparel buying companies' dynamic business planning processes and their nature of process and decision interdependency that arises in the course of developing global-oriented

products. Generically, the product development involved several distinct plan work process systems: (1) anticipating fashion trends and product opportunities; (2) developing coordinated portfolio of product lines and their specifications; (3) budgeting and allocating fashion merchandise procurement; (4) organizing materials and logistic requirements for production; and (5) designing distribution and handling systems. In our observation the process systems are very human-tied and involved essentially 103 cross-country activity tasks. The cases studied represent today's virtual enterprising concepts; whereby fashion products are designed and developed collaboratively by globally dispersed functional teams and enterprises. All the operations along sorts of global supply pipelines are orchestrated and monitored in virtual form, and interdependently coordinated at the lowest levels of organization.

## 2. Industrial motivation

The research study was motivated by one of the strategic industrial development projects in Hong Kong. The main objective was to study the feasibility of using advanced technologies for coping with present and future industry challenges in coordinating geographically dispersed supply activities. One of the approaches entailed better management of such was to define and develop activity coordination systems that could improve the existing product development operations more flexibly and responsively according to changing market demand and climates. At the same time, they could significantly reduce the uncertainty in the final stages of product embodiment and manufacturing, and effectively predict the eventual performance. Six international fashion

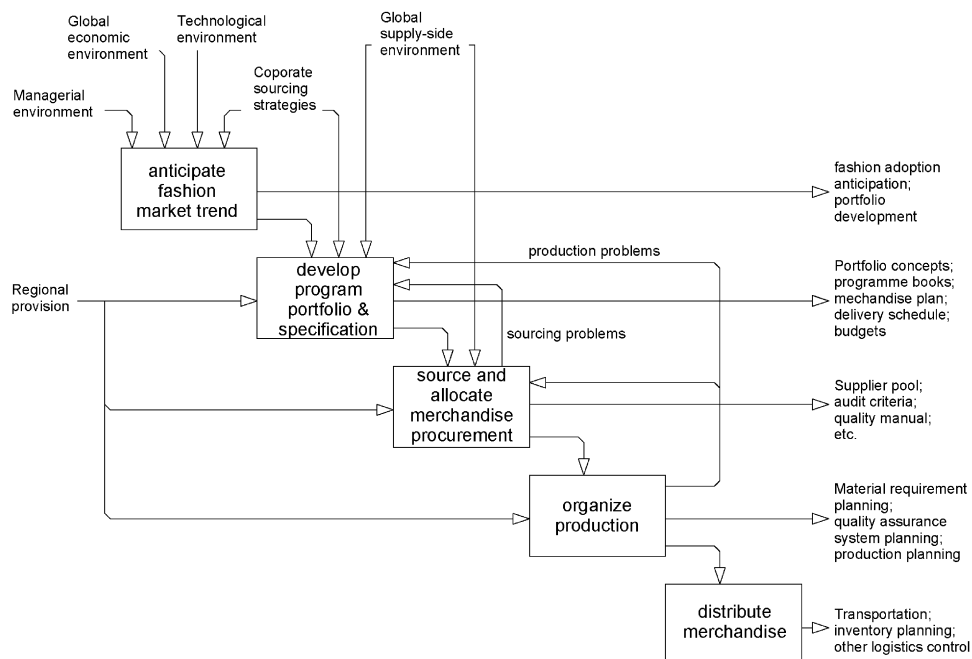


Fig. 1. Activity process of apparel merchandising in global environment.

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