

# Game Theory Strategy for Information Standardization Work in Manufacturing Enterprise

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## Abstract

A four part approach provides an effective strategy for the information standardization work in manufacturing enterprise based on game theory. Firstly, it analyzes the four kinds of game characteristics of information standardization. Secondly, it establishes the non-cooperation game model of manufacture information work using the classics non-cooperation game models of the common article, such as Prisoners Dilemma, Boxed Pigs and Chicken Game, then concludes the three problems of effect the enterprise information work. Thirdly, it proposes a cooperation game algorithm and a model of enterprise information standardization, and advances the cost characteristic function of the model, then calculates the actual value based on the Shapley-Snow procedure. Finally, it concludes the game strategy sets of the non-cooperation and cooperation game model, and establishes a scheme collection of information standardization which can guide enterprise to execute the information standardization.

*Keywords: Information standardization work, non-cooperation game model, cooperation game model*

## 1. Introduction

To standardize information current situation, the most fundamental reason making enterprise bringing together the "information isolated island" is that the participants considering individual benefit only, but ignoring the collective and integrated benefit, which leads to information standardization and information integration is not ideal<sup>[1-2]</sup>. Tracing to its cause, two aspects are mainly incarnated, one aspect is any enterprise or department will fend to make themselves to control the standardization in order not to modify their own system, the other aspect is participator needs to plough into funds, manpower, material and time to the work of information sharing and standardizing. If the proportion of output and input is not accepted by individual, it is difficult to make the individual selfless to participate in the sharing information standardization construction<sup>[3]</sup>.

At present, there are not any correlative mature tactics for information standardization work at home and abroad. Because of information standardization having characteristic about "common article", this paper quotes the classics game models, such as "Prisoners Dilemma, Boxed Pigs, Chicken Game"<sup>[3]</sup> to analyze the composing of information standardization and to build information standardizing game model of cooperative and no-cooperative. So, this paper will set up the fundamental theoretical frame to support the information standardization.

## 2. Game Character of the Information Standardization

The influencing factors are comparatively complicated and take on four kinds of game characteristic as follows.

**Character1:** The game elements of the information standardization. "Participant" means the individual who participates in information standardization work. "Benefit" means participant who promote their business through participate in information standardization. "Payment" means the work that participant must do for information standardization. "Tactics space" referring to participant chooses strategy space in information standardizing. "Balance" points to the relatively stable balance that participant reach ultimately for different choices.

**Character2:** The game process of the information standardization work. There are much data and information exchange between the manufacture enterprise systems. Every information system hanker the maximum efficacy by using the standard information under certain regulations. Therefore, the work of participate in the information standardization is a game process.

**Character3:** The intellect of the information standardization work which means the systems and the departments which participate in the work attaching importance to their own profit. Game is commented on the supposition that "the intellect of participant" is also founded in information standardizing.

**Character4:** The publicity of the information standardization work. In manufacturing enterprise, a great deal of standardization information runs through the entire process in product life cycle which is used and shared by each system.

## 3. Non-cooperative Game in the Information Standardization

This paper uses the classical non-cooperative game model to analyze the information standardization in manufacturing enterprise like Figure 1.

**Definition 1:** Information System, which is developed to accomplish some special work in manufacturing enterprise.

**Definition 2:** Large Common System, which exchanges Information with other systems frequently, For example: ERP, PDM, etc.

**Definition 3:** Small Dedicated System, which is developed to accomplish special work in special operation domain. For example CAPP, MES etc.

**Definition 4:** Systems with the similar application scale, which is referred to two information systems with similar function and similar application scale.