

Rule-based Partner Relationship Management (PRM) for Collaborative e-business

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ABSTRACT: *The key factor of the current e-business is collaboration. It is especially crucial to Partner Relationship Management (PRM) that manages the collaborative relationships between a company and its partners and controls available conflicts. Therefore, business processes supporting the dynamic nature are to be implemented on information systems. To achieve it, collaborative processes that respond to various changes flexibly and promptly are to be applied to PRM. This paper suggests rule-based PRM that support PRM's collaborative processes by rules that reflect business policies and processes, and indicates the implementation of a prototype that presents how rules are embodied in rule-based PRM.*

1. Introduction

The current explicit competitiveness is pushing enterprises to step into a relationship marketing that is based on the phenomena that the more powerful position of customers in business makes companies try to retain current profitable customers [6]. It has caused substantial changes not only in the business-to-customer marketing arena, but also in the business-to-business marketing arena. Companies try various channels to approach customers effectively and friendly through proper business strategies such as CRM (Customer Relationship Management). Faced with a vast proliferation of competition as well as markets that are often becoming increasingly fragmented, a number of companies have also chosen to outsource many activities of the sales function to resellers who have the market knowledge, sales expertise, or distribution network to bring the product to market more effectively and efficiently [2]. Especially partnering with resellers has taken on an increasingly important role in the business-to-business marketing field. Traditionally, suppliers have managed their relationships with partners (resellers) using inefficient, fragmented, and labor-intensive communications processes. As a result, the tasks of managing resellers and of precisely monitoring reseller productivity, converting leads to sales, have been difficult indeed [9]. And the relationships among business participants, such as customers, resellers, distributors, retailers and suppliers are on very complex channel networks. Despite this complexity and conflicts, enterprises have expanded their marketing channels because they recognize the benefits and crucial roles of partners. And they try to build collaborative relationships between suppliers and resellers. It creates a new e-business strategy, Partner Relationship Management (PRM) that supports, maintains and improves the relationships with partners for augmenting

benefits and values. In the case of PRM, this requirement is crucial because it pursues collaboration with partners. Therefore, to satisfy the need, collaborative processes that are flexibly and promptly operated to the dynamic changes are implemented based on rules that articulate business policies and processes. The PRM to accept this concept is a rule-based PRM.

Collaborative e-business creates a great number of challenges to companies. Companies must overcome challenges because e-business promises a lot of opportunities to create benefits. Therefore, it is important to satisfy the requirements of collaborative e-business. In the business environment, the dynamic and rapid changes are the biggest obstacle and characteristic. To solve it, business operations running on information systems including PRM have to implement the processes that flexibly and promptly respond to dynamic changes. Therefore, in this paper, a rule-based PRM is suggested to support dynamically changing business processes in collaborative e-business. Rules include the concept of business rules of GUIDE so that they pursue to embody and articulate abstract business policies. The rules are adopted to support collaborative processes that require flexibility and resilience, which is appropriate to be applied to PRM whose main purpose is the collaboration with partners. And the detailed method to implement the rule-based PRM is suggested through the implementation of a prototype.

II. Related works

Partner Relationship Management (PRM) has been interpreted with various definitions in e-business until the present. PRM is a business strategy to improve relationships between companies and their channel partners [1], which enhances a company's ability to work with a leverage demand network partners to better markets, sell and serve end customer [4]. Someone say that PRM is a subset of an overall business-to-business (B2B) CRM (Customer Relationship Management) strategy, which encompasses people, processes and enabling application components [10], and the application of Relationship Management strategies and technologies to the unique needs of indirect sales channels.

Partner refers to independent business entity that connects manufacturers and end-customers. Partners can take the form of indirect sales channels, value-added resellers, distributors, or business alliances [11]. And a channel is the route, path, or conduit through which products or things of value flow, as they move from the manufacturer to the ultimate user of the product [8] as strategic assets that can provide competitive advantages for overcoming competitors through effective distribution [7].

PRM is often compared with CRM. While CRM provides knowledge concerning how to recruit, promote, retain customers, PRM focuses on how to build collaborative relationships with partners through effective and reliable processes. Because a partner is a coworker who enhances the amount of sales, PRM focuses on collaborative sales. A brand owner both monitors its partners and provides valuable information or benefits to partners on PRM. And they are positioned at different sites on the value chain, as in Figure 1. PRM handles partners such as distributors, resellers and retailers, while the target of CRM is customers and SRM takes a position at the back office

related to suppliers.

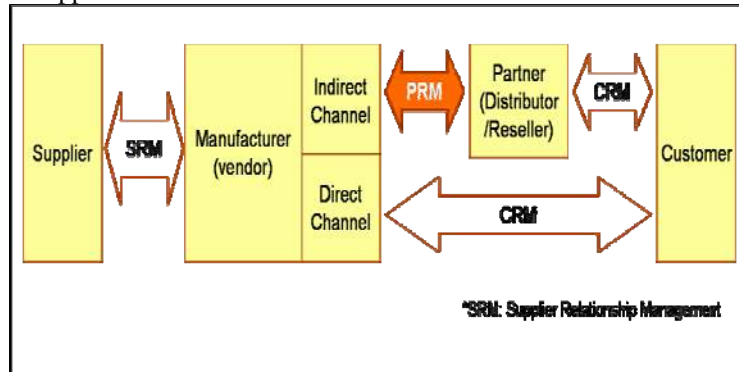


Figure 1. Relationship between PRM and CRM

PRM is a value-creating strategy where both the company and partners gain benefits based on the improvement of relationships in indirect sales markets. And it is a type of solution in B2B e-commerce that creates dynamic changes and complex networks so that it supports collaboration among business participants such as a company, a reseller, a distributor and so on.

Many e-business solution vendors have introduced PRM solutions recently. They provide various functionalities based on common recognition about it such as partner management and sales. CRM focuses on marketing to access to customers directly so that CRM applications provide functionalities such as sales, call center, marketing, forecasting and analytics of customers. However, PRM applications support for partners to enhance benefits and help brand owners to manage partners effectively through the establishment of robust relationships with partners. Mirani et al. suggested 7 features of PRM listed in Table 1 aggregating the existing functionalities [9].

Table 1. Key components of PRM

Components	Detailed sub-functions
Lead Management	Lead capture, distribution, tracking, re-routing, accountability
Partner Profiling	Partner information such as geography, specialties, client history, performance, transaction and interaction data, etc.
Order Management	Configuration, pricing, order placement and tracking, product returns and problems
Training	Online product, sales, and technical training
Report Generation	Ad hoc reporting such as marketing, sales, and service performance reports
Content Management	Product, company, and industry information, partner-specific Web pages
Fund Management	Coop, MDF, rebates, promotions, etc.

III. Rule and PRM

3.1 The meaning of rules

Gray investigated rules in many ways[5]. One technique divides rules initially into two categories: constraint rules and derivation rules. And the Business Rules Group states two definitions of rules from the business perspective and the information system perspective; from the former a rule is a directive, intended to influence or guide business behavior in support of business policy, and from the latter it is defined as a statement that defines or constrains some aspect of the business, which is intended to assert business structure, or to control or influence the behavior of the business. Therefore, rules are statements declaring business policy, condition, or behavior. They apparently influence or control processes so that processes are ready to follow the rules. A process is a topologically ordered set of one or more linked procedures, activities, which together attempt to reach a common object, and an activity is a single logical step within a process and atomic operation requiring human or machine resource(s) to support the execution of the process [3]. The framework of business processes in e-business generally includes a role, a process, and an activity as shown in Figure 2. Therefore, every component of the framework is to be reorganized in order to promptly implement rules created by the dynamic nature of e-business.

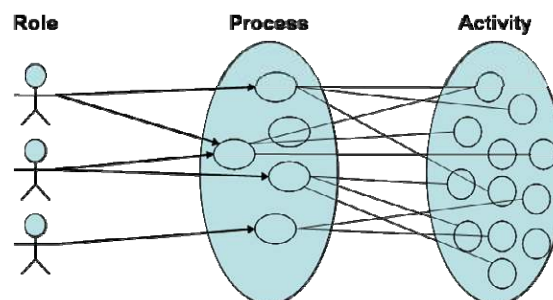


Figure 2. Framework of business processes in e-business

A rule is not only a statement of business policy, behavior or condition, but also a coordinator of all components of the business processes. A rule can be reflected by business processes successfully only if it controls them based on the declared conceptual business statement.

3.2 Rules in PRM

Among many types of B2B eCommerce, especially PRM needs rules. As mentioned above, PRM is to maintain the collaboration with partners so that effective, flexible, and prompt responses to the dynamic changes are very important. If a company has a

relationship with a partner under a certain policy or condition, the context of the relationship is reflected by processes. But the meaning of the relationship can change according to the policy or condition between a company and a partner. For instance, if a partner is a reseller that handles various brands, including a company's products, it can sell different models under a policy that modifies the type of distributed products. Even the same partner may have different relationships with a company. Whenever changes occur, it is expensive. In addition, much time and effort is required to redesign and implement processes. Therefore, a way to both minimize the cost and accept the context of policy or condition must be investigated. Rules are the best way. In PRM, the general structure of processes follows the framework in Figure 2. There are basically roles, processes and activities to operate PRM processes, as in Table 2.

Table 2. Key roles and related processes and activities in PRM

Role	Process	Activity
Lead Administrator	Manage Lead	Create Lead, Update Lead, Delete Lead, Read Lead
Partner Manager	Register Partner	Create Partner, Update Lead, Delete Lead, Read Lead
Channel Manager	Assign Lead	Select new lead, Read/Update contact information, Read/Update lead memo, Read lead History, etc.

The rules in PRM are categorized into two types; the first is role-based rules and the other is event-based rules. They are classified based on the subject of a rule, what triggers it. In the case of a role-based rule, a role such as lead administrator, partner manager, and channel manager creates a rule and influences the entire process. In the other case, an event that depends on certain period controls some processes, activities, or even attributes.

3.2.1 Role-based rule

To implement business processes on the Internet for e-business, the first step is to arrange roles that define the accessible operations. Thus, to determine a role is closely related to rules, because each role organizes one or more operations, and each operation can be applied differently based on a role, as shown in Figure 3.

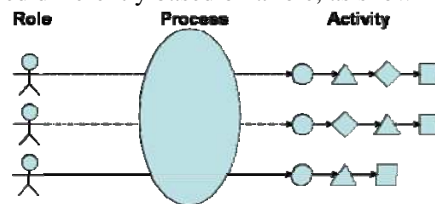


Figure 3. Different rules applied to one process

For example, rules about lead assignment are as follows.

- 1) Rule title: Lead Assignment with a partner manager of partner A
 A partner manager of partner A assigns a lead to a subordinate assignee only if

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another partner manager of partner A verifies it.

2) Rule title: Lead Assignment with a partner manager of partner B

A partner manager of partner B assigns a lead only to a subordinate assignee. In the first case, the assignment process can be carried out through the activity where another partner verifies an assigned lead. In the latter case, the process may be executed without the verifying step, as shown in Table 3. In this case, both roles are performing the same process, assignment, but the activities are different because they are recombined by different rules based on roles.

Table 3. Different rules applied to a process based on roles in PRM

Role	Process	Activity
Partner Manager A	Assign Lead	Read new lead→Select a new lead→Choose a proper partner manager→Request assessment to the partner manager→ Choose a proper subordinate assignee→Assign the lead to the assignee
Partner Manager B	Assign Lead	Read new lead→Select a new lead→Choose a proper subordinate assignee→Assign the lead to the assignee

3.2.2 Event-based rule

In PRM, many operations occur that are influenced sensitively by environmental conditions, such as seasonal or event-based issues. Setting up a rule according to an environmental issue is to change some attributes or factors belonging to one activity as shown in Figure 4.

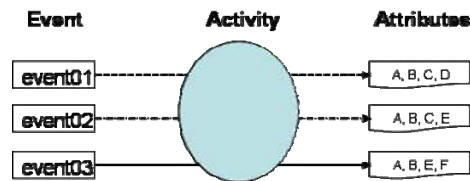


Figure 4. Different rules applied to one activity

For example, the leads aggregated during a campaign should be determined if they are valuable or not. Then the decision factors are different based on the characteristics of each campaign. The rules of campaigns are the following.

1) Rule title: Campaign for the promotion of new products

The campaign for the promotion of new products named Campaign A aggregates interesting product and basic data as required information.

2) Rule title: Campaign for the commemoration of the foundation day

The campaign for the commemoration of the foundation day named Campaign B aggregates gift and basic data as required information.

Campaign A and Campaign B request different attributes, as shown Table 4. These rules are for establishing the standards to make a decision with considering all of available factors or attributes.

Table 4. Different rules applied to an activity based on events in PRM

Event	Activity	Attribute
Campaign A	Campaign	Company name, Email, Phone, Interesting Product , etc.
Campaign B	Campaign	Company name, Email, Phone, Gift , etc.

3.2.3 Framework of rule-based PRM

The processes in PRM are correlated to the networks among related business participants. Rules control the complex relationships as an intermediate. The conceptual framework of rule-based PRM in Figure 5 shows that a lot of requests and answers coexist in the system.

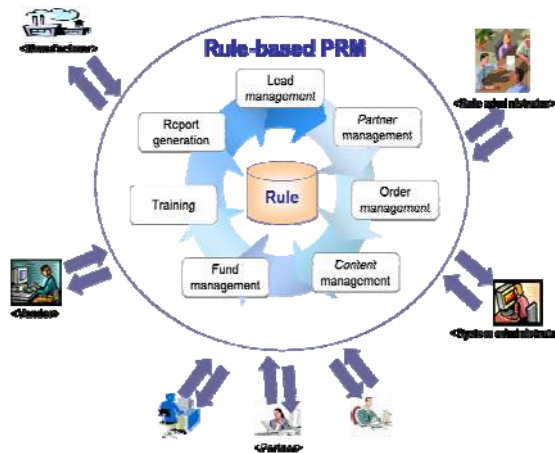


Figure 5. Conceptual framework of rule-based PRM

As in Figure 5, a rule-based PRM has various relationships with business participants. Manufacturers may receive order requests and meet the orders based on order related rules. Vendors may register leads and filter or rank them according to lead related rules and manage partners under certain standards. Systems administrator may manage systematic issues such as roles, securities, contents and so on. In this case, rules also influence operations. Partners may request funds, follow up leads or get training. Each operation can be controlled under predefined rules. Rule administrators manage rules that articulate the conceptual statements of business policies and processes. They may modify rules considering various conditions of rule-based PRM in terms of processes, authorities and so on.

Rules are statements that clarify and declare business policies and processes. When they are reinterpreted in terms of information systems, they function as intermediaries to manage all components of processes in e-business, such as a process, an activity, an attribute, a role and an event that organize operations of PRM. To control the components influenced by rules, rules are to be articulated in information systems. To manage rules effectively, they are to be stored in a well-defined repository. Therefore,

rules function in the information system as shown in Figure 6. Rules are stored in one entity, Rule. And related entities are linked to the rule entity under certain relations. The entities of role and event are placed as triggers to call certain rules. They are conditions in rules. As the results, the entities of process, activity and attribute have relations with the rule entity, which are reorganized according to certain conditions. In the rule entity, these conditions and results are defined with identified rule IDs.

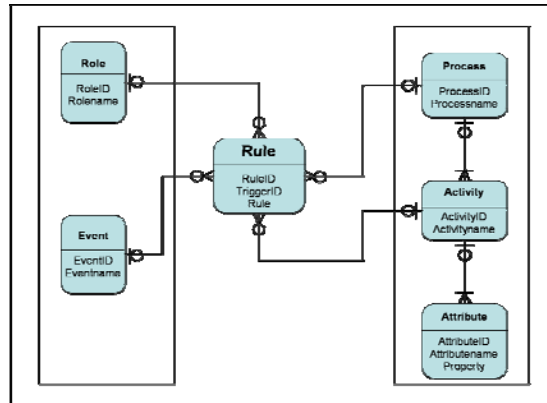


Figure 6. Data structure of rule-based system

The repository is ready to answer instant changes triggered by role-based rules and event-based rules. When role A logs in, the system looks for related rules and loads linked processes, activities, and attributes. If the characteristic of role A changes, the related rules also change redefining the relations with processes, activities, and attributes. In case of events, before the expiration of an event, the rule is valid through the whole system. Every process is operated with same attributes of the event during the valid period. Therefore, entity Role and entity Event play the role of triggers, and entity Process, entity Activity and entity Attribute are controlled by entity Rule connecting each other under defined relations.

IV. Prototype Implementation

The rules are to be represented as formalized forms. In this paper, XRM (Extensible Rule Markup Language) that is an extension of XML (Extensible Markup Language) is used as the formalized language. Among various functionalities mentioned above, Lead Management is one of those that handle dynamic changes. Here, this prototype takes the example of 'Partner Manager A' mentioned in Table 3. The process, Lead Assignment, is operated by the rule named 'Lead Assignment by a Role'. The analysis of the process is to precede representing the rule in formal language. Here, UML (Unified Modeling Language) that is a representative object oriented modeling language and analyzes real processes in easy notes is applied. Firstly, the process can be presented with the use case diagram of UML (Unified Modeling Language). This process is operated by several roles such as Partner Manager A and Partner Manager B. While it is explained as one process, "Assign Lead", the internal activities are

complex. In the case of Partner Manager A, the details are expressed in UML's activity diagram. To apply the rules mentioned above to a real application, it must be translated into computer-recognizable languages. A standard language should be used to articulate them by satisfying the characteristic of PRM. To express rules sufficiently, all proposed three components of XRML, the Rule Structure Markup Language (RSML), the Rule Identification Markup Language (RIML), and the Rule Triggering Markup Language (RTML) are used.

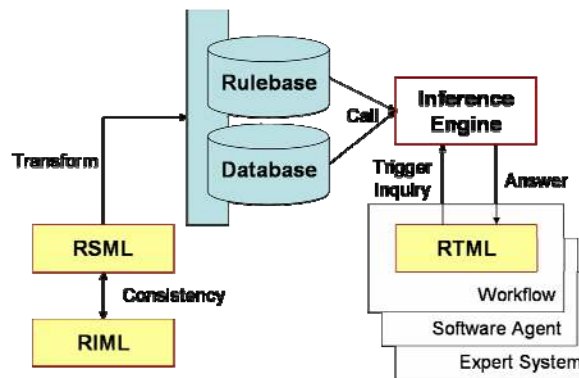


Figure 7. Architecture of XRML

RIML identifies rules in natural language such as HTML or XML on the Web and RSML is the intermediate representation that can be automatically transformable to structured rules to process with inference engines. RTML is a language that defines the conditions under which certain rules will be triggered. Figure 7 indicates the architecture of XRML. The rule is expressed in natural language so that it is easily understandable to any executives who establish business policies and easily created by them. The marked tags are explained in Table 5.

Table 5. Legend of elements and attributes in RIML

Element/Attribute	Description
Rule	The element "Rule" envelops the body of rule. The presence of this element indicates that this is contains at least one variable, value, and operator, etc. At least one must be present within RIML.
RuleTitle	It is the title of the Rule. It can be left out should a specific rule be not included in rule group.
variable _i	The literal element "variable" represents variable names, where i=1, 2, ..., n
value _j	It is the literal element that represents value names, where j=1, 2, ..., m

The rule title of the RSML is the same as that of the RIML, which means that all of them state the same rule. The components of XRML operate with the rule repository. RTML is called by certain roles and events that need rules and access the Rule entity to activate proper rules declared in RSML. RSML defines the structured rules to operate rule-based PRM under the rules. RSML is created by RIML that is determined by rule administrators who manage rules that reflect business policies and conditions.

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The architecture of rule-based PRM is shown in Figure 8.

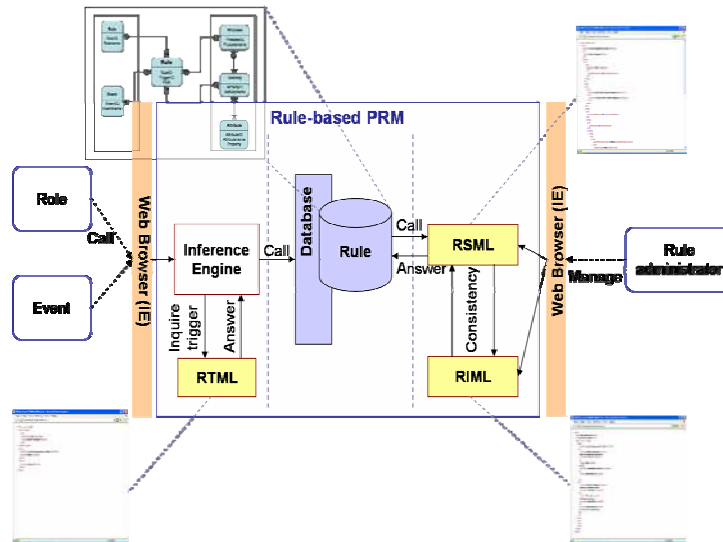


Figure 8. Architecture of rule-based PRM

The processes of PRM operate under the rule system that is managed in the rule management. Rules are applied to the system beginning with the time when a user logs in. The processes such as lead management can be managed dynamically under the rules. The system of rule-based PRM is given in Figure 9.



Figure 9. System of rule-based PRM

A rule-based PRM not only embraces dynamic business environments, but also enables one to maximize flexibility and reusability in facilitating processes and activities in PRM through reorganizing processes, activities or attributes that are designed based on the concept of component based design. Consequently, this makes it possible to implement collaborative processes that support flexible business processes that rapidly respond to changes.

V. Conclusion

As B2B e-Commerce spreads widely, PRM also plays an important role to manage various channels or partners in complex business environments. It has emerged as a business strategy for value-creating relations with partners. As e-business moves toward collaborative e-business paradigm, PRM has to articulate collaboration with partners in both conceptual and systematic environments.

In this paper, the meaning of PRM is investigated as a new concept in e-business. And the needs of collaborative processes that flexibly and promptly respond to changes in collaborative operations in e-business are researched. A rule is a proper concept to accept the dynamic business environments related to partners because it clarifies and declares conceptual business policies and processes and applies them to information systems. Here, a rule-based system is proposed as a way to run collaborative processes for PRM. Rule-based PRM promptly responds to various situations triggered by roles and events in processes by recombining the proper processes, activities or attributes based on a suitable rule. Prototype implementation of lead assignment rules is achieved and the rules are analyzed using UML, and implemented in XRML that represents rules. All XRML components, RIML, RSML and RTML are linked to the rule repository of the rule-based system.

Rule-based PRM can give companies in the complex networks with various partners the competitiveness to promptly respond to the dynamic business policies and processes in collaborative e-business that requires more flexible and rapid changes. In future work, the implementation of this rule-based system is to be expanded to all of available rules and validated.

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