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Teresita Rojas  
*Universidad Simón Bolívar*

M Perez  
*Universidad Simón Bolívar*

L. Rivas  
*Instituto Nacional de Investigaciones Agrícolas*

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# PROPOSED KNOWLEDGE REUSE MODEL FOR APPLICATION IN VENEZUELA

**T. Rojas**  
Universidad Simón Bolívar  
[trojas@usb.ve](mailto:trojas@usb.ve)

**M. Pérez**  
Universidad Simón Bolívar  
[movalles@usb.ve](mailto:movalles@usb.ve)

**L. Rivas**  
Instituto Nacional de Investigaciones  
[lornelr@inia.gov.ve](mailto:lornelr@inia.gov.ve)

## Abstract

*The reuse of knowledge has a significant impact on an organization's performance and the part it plays in a competitive environment. It is a process in which knowledge is an integral part of the organization, through the interaction between people-driven aspects such as change management and organizational culture; technological aspects such as systems, information and communication technologies; and organizational aspects such as knowledge flows and the formal and informal mechanisms that facilitate its integration. The relationship between these organizational dimensions reveals the systemic nature of knowledge reuse, with knowledge flowing both within the organization and between the organization and its environment. However, for today's organizations, the ability for them to reuse their knowledge poses a challenge. The purpose of this paper is to propose a model that highlights those aspects likely to affect the Knowledge Reuse process. The first release of this model is now ready and is supported by Critical Success Factors for Knowledge Reuse oriented towards organizational effectiveness.*

**Keywords:** Knowledge, reuse, model, critical success factor

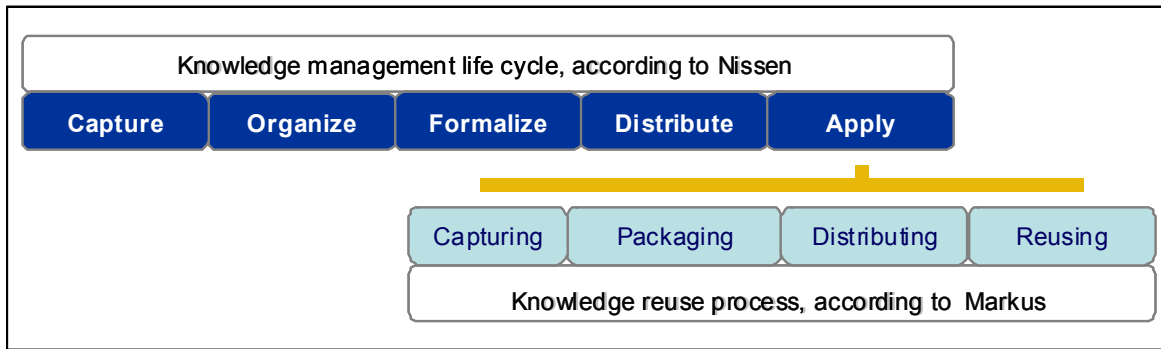
## Background

At a time that is characterized by such factors as growing technological development in the field of information and communications, the establishment of national and supranational networks (De Souza et al. 2001) and organizational concept development, and the appearance of new paradigms in human resources management and other areas, the role of knowledge and its management in an organization is increasing in relevance. Hence in competitive environments, management decisions are made on the basis of knowledge that is built socially and dynamically as business processes evolve.

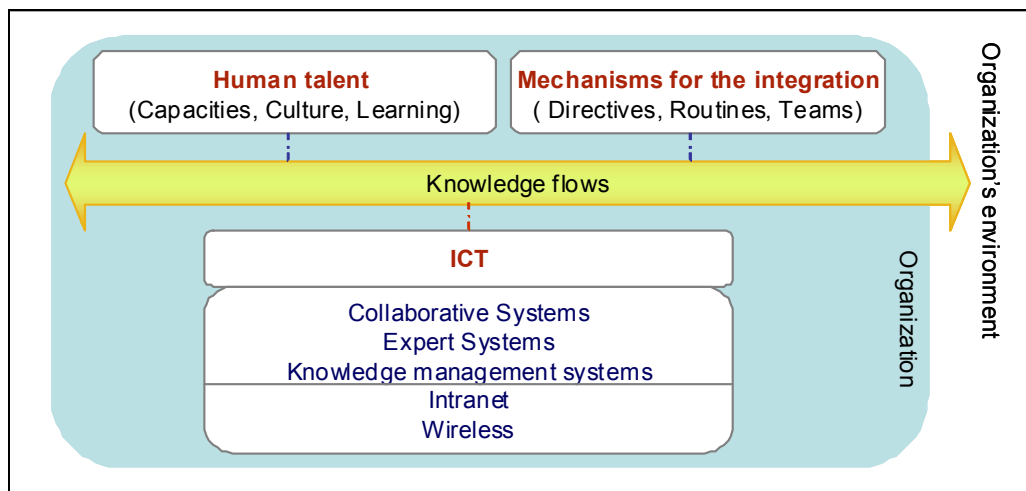
Various authors, Alavi (2001), Markus (2001) and Lytras (2001) for instance, have introduced Re-use as a particularly important concept in Knowledge Management. Knowledge Reuse has had relevance for information engineering and software engineering and it has great impact in systems development process. Pressman (1996) relates to creation and reuse of constructive software blocks, catalogued for an easy reference, standardized for easy application and validated for simple integration.

Knowledge must be part of the organization in order to be reused in the decision making. This conforms a dynamic process that closely resembles the different stages of the knowledge lifecycle (see Figure 1).

The knowledge reuse process requires that this knowledge be **integrated in the organization** and stem from accurate ongoing interaction between people-driven aspects such as change and organizational culture; technological aspects such as information and communication technologies (ICT); and organizational aspects such as knowledge flows and the mechanisms that facilitate its integration (see Figure 2). Many different aspects are relevant to knowledge integration.



**Figure 1. Knowledge Management Lifecycle and Knowledge Reuse Process**  
 Source: Adaptation of Nissen (2001) and Markus (2001)



**Figure 2. Many Different Aspects Are Relevant to Knowledge Integration**

The knowledge reuse process can be supported on the one hand by the structures, capacities and competencies of its own resources and the people involved in it, and on the other by elements of that same environment, such as the presence of emerging technologies; the presence of renewed leadership and management styles in times of change; the conception of the company as an open system, in a constant and dynamic relationship with its environment; and the new paradigms in human talent management.

## Knowledge Cycles and their Importance

Knowledge Management is being handled increasingly in relation to areas like management and information systems. However, most of the experiences documented focus such areas as generation of knowledge, relationship between tacit and explicit knowledge and storage of ICT-based knowledge.

In the opinion of Nissen (2001), reuse, use and application are concepts designed to attain a common goal. All the models referenced in Table 1 show the presence of the Reuse elements with different denominations. Davenport and Prusak model includes the Absorption and use of the knowledge like part of the same transference process (Davenport and Prusak 1998).

**Table 1 . Some Knowledge Lifecycle Models**  
 Source: Adaptation of Nissen (2001)

MODEL	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
DESPRES AN. CAHUVEL	Create	Map / bundle	Store	Share/ Transfer	Reuse	Evolve
GARTNER GROUP	Create	Organize	Capture	Access	Use	-
DAVENPORT Y PRUSAK	Generate	-	Codify	Transfer	-	-
NISSEN	Capture	Organize	Formalize	Distribute	Apply	-
AMALGAMATED	Create	Organize	Formalize	Distribute	Apply	Evolve

For Markus (2001), although knowledge reuse has been observed and researched under many different names, in many different settings, findings about knowledge reuse have remained relatively dispersed and unintegrated. According to Lytras though, as far as business training programs are concerned, competencies in the organization are created through vital processes where the main problem appears to be the absence of knowledge management systems that increase their reusability (Lytras 2001).

As stated in this paper, the consideration of technological aspects in the integration of knowledge, seen in relation to other aspects of a human and organizational nature, will facilitate a comprehensive approach leading to the identification of Critical Success Factors (CSF) connected with knowledge reuse.

### A Case Example from the Venezuelan Agricultural Sector

Agricultural sector is at the present time of great importance for Venezuela. It has the potential to become a strategic opportunity for the products diversification and traditional services (oil-based) of this country. This opportunity have been created significant spaces so that our country is now being inserted in new markets. Venezuela has research institutions on Science and Technology, among them those related to the research agricultural.

These type of research institutions have a reciprocal interaction, that it will be able to drive the programs for the generation and application of the knowledge according to Seaton (2000), in order to face the associated challenges of technological, economic and social development.

This context is a very good reason for having an important rol in research agricultural investigation. Moreover in our country, where the opportunities of the development are directly tie with science and technology participation. (Montilla 2000). CSF model will be applied to an agricultural research institution in Venezuela. In this institution the knowledge that flows is essential, given the nature of its processes .

Therefore, through these Critical Success Factors which are in turn *key activities for the achievement of an organization’s objectives* (Ivancevich et al. 1996), an important contribution to the organization’s effectiveness is generated. This contribution is supported by a study of the organization at its different levels, from the point of view of elements and their internal and external relationships. This aspect is vitally important for Venezuelan organizations with increasing staff turnover due to the country’s economic recession, since it enables organizations to stabilize when faced with staffing changes.

This proposal has been designed with a view to making recommendations to organizations involved in research, agricultural in particular, in Venezuela. The following table summarizes the characteristics of the sector: in this case a Venezuelan agricultural research institution.

**Table 2. Characteristics of the Sector: Venezuelan Agricultural Research Institution**

<b>ORGANIZATIONAL PROCESS</b>	<b>RESULTS IN:</b>
Core processes	Research, Technological Negotiation and Institution Building
Geographical breakdown	National scope. Regional research centers
Percentage of administrative staff	14 %
Percentage of researchers and technicians	52 %
Knowledge within a strategic approach	Knowledge is a substantive component of the Strategic Plan
Change initiatives	Institutional modernization project
Involvement in national and international networks	Agreements and alliances with institutions and research networks, the State, agribusiness and the rural environment.
Internet access	Research centers have Internet access
Internal working networks	Inter-center projects. Multidisciplinary teams.
Use of local communication networks	Centers have LAN networks
Use of e-mail	High-frequency mass use.
Use of mailing groups	Recently incorporated
Organizational levels represented in the mailing groups and accounts	Diverse
Existence of knowledge management systems	None
Internet presence	A corporate website
Existence of corporate Intranet	Construction in progress
Corporate systems providing some level of knowledge management support	Documentary systems and project management system
Integration of existing systems	Integration in progress
Resources available for investment	External resources

This work tries to respond to questions around which one aspects are more relevant on the Knowledge integration process in the organization in such a way that this knowledge could be reused indeed and so to take care of it with effectiveness according to the demands of a changing environment. This restlessness obeys to the necessity to maintain and to reuse the knowledge that is generated and flowed as a product of the Agricultural Project management activities.

## **Proposed Methodology**

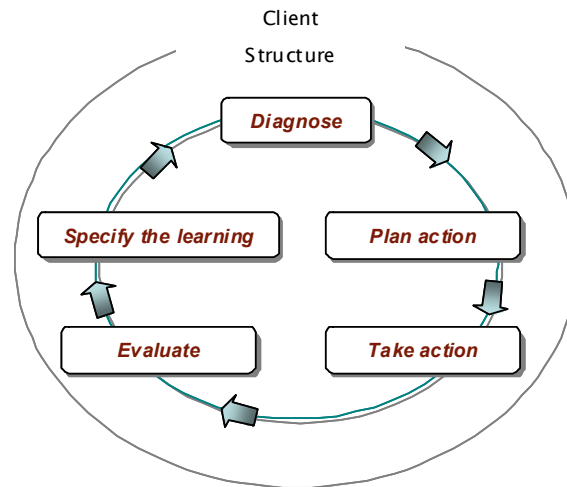
By delivering growing returns and continuous advantages (Davenport 1998), knowledge can be a sustainable advantage for an organization. However, its reuse effectively calls for interaction between different organizational dimensions and the environment as well.

For Callaos (1995), systemic methodologies are adaptable methodologies, proposed in accordance with their surroundings and thus more effective in dynamic environments. The perception of components and relationships identified in relation to knowledge reuse, have characteristics that associate it with systemic behavior.

This paper will be developed based on an adaptation of the research–action method. Its concept arises from behavioral science and is applied when observing the human activity systems that occur during the problem-solving process, where the researcher ceases to be an observer who is detached from the research issue, and becomes a participant within the pertinent human group

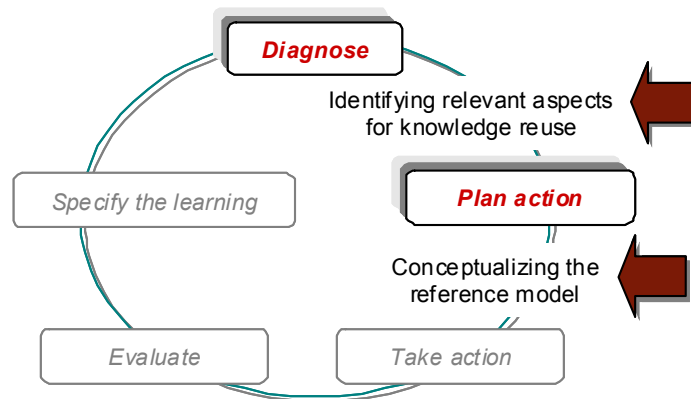
(Checkland 2000). In this case the investigator will be an observer and he is going to be participating in the administration of the instrument and the evaluation of his results, without being part of the selected sample.

Susman and Evered (cited by Baskerville and Pries-Heje 1999), propose research–action through a five-phase cyclical process: Diagnose, Plan action, Take action, Evaluate and Specify the Learning (see Figure 3).



**Figure 3. Research–Action Phases**  
Source: Adaptation of Baskerville and Pries-Heje (1999)

As this research work is in progress, this paper will emphasize the Diagnosis, Planning and Decision-Making phases. Hence the first partial result of the research, which refers to the Critical Success Factors proposal, will be explained in detail, and the definitions of each one will be based on the objective of this research



**Figure 4. Research–Action Phases Emphasized in this Level**

The Figure 4 shows, at the Diagnose phase, the identification of the topics or related aspects with knowledge reuse and the relationship between them, by means of a revision of literature. The research objectives and scope are defined in the Plan action phase and, later on, the previously identified relevant aspects are reviewed and organized in order to conceptualize the reference model.

## Model for Knowledge Reuse

In order to work on the aspects identified as likely to influence the Reuse process, these are instantiated as Critical Success Factors (CSF) that can be measured.

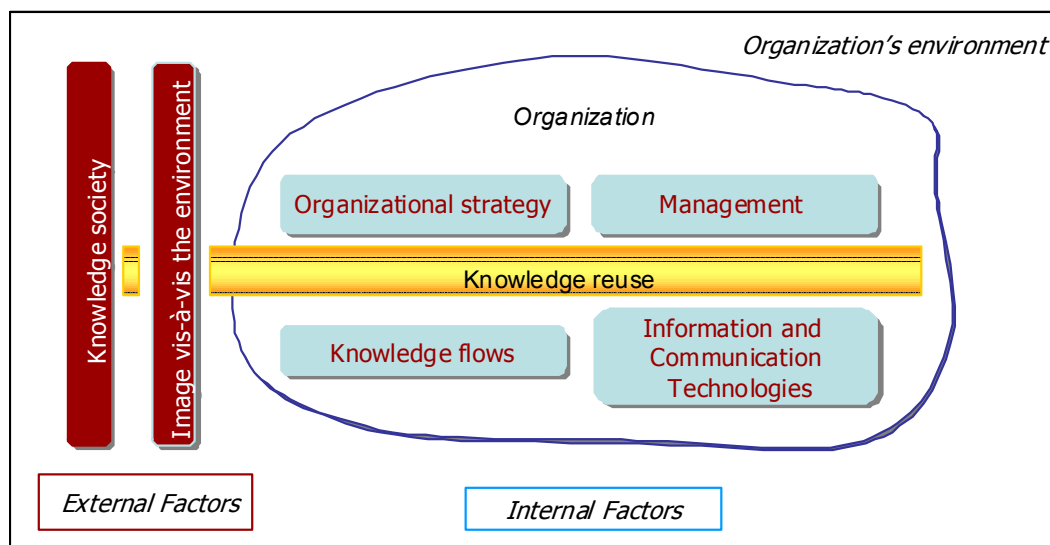
A set of critical factors of success allows to make an integral control of the management, they not only addresses themselves the results, but the way as the results are obtained (Beltrán 1998). Knowledge Reuse CFS were conceived on the base of those elements, external and internal, able to affect directly the process and the profit of the reusability.

The proposed CFS are based on the relationship between the reusability process and the organizational dimensions involved. These relations were identified through the study of the different stages, situations and rolls in the reusability, and its interaction with people-driven aspects; technological aspects such and organizational aspects. In this way elements arose whose impact and importance for the reusability are such, that they become critical.

The identified elements are of different types and can be difficult to measure. For this reason, the factors are structured like a set of indicators. These indicators are a way to make more tangible and objective the perception of the critical factors of success. Moreover, they were defined operationally through different variables in order to obtain one more comprehensive vision of each indicator.

CSF are further categorized as Internal and External. The Internal ones are those that exist within the organization itself and influence the knowledge integration process in different ways, and hence its reuse by decision-makers: knowledge flows, Organization strategy, Management and Information and Communication Technologies.

The External CSF refer to those that exist in the environment in which the organization evolves and with which it interacts in different ways, influencing the knowledge integration process: knowledge society and Image vis-à-vis the environment (see Figure 5).



**Figure 5. Model Reference Framework**

Based on Figure 5 it was proposed the following CSF. Each (Internal or External) CSF is in turn broken down into Variables which are specified through Indicators (Operational Definitions). See Table 3.

**Table 3. Knowledge Reuse Model**

<b>Factors</b>	<b>Indicators</b>	<b>Operational definition</b>
<i>Internal Factors</i>		
Organizational strategy	Knowledge as part of the organizational strategy	<ul style="list-style-type: none"> <li>• How often is the term knowledge used in the organization's vision and mission?</li> <li>• How often is the term knowledge used in the organization's principles/values?</li> <li>• Are there any organizational policies regarding the exchange of information/knowledge?</li> <li>• What percentage of projects are related to knowledge and/or knowledge management?</li> <li>• Does the strategic plan include IT and IS?</li> </ul>
Management	Effectiveness in the decision-making process	<ul style="list-style-type: none"> <li>• How frequently is knowledge generated or shared as a result of formal or informal meetings recorded?</li> <li>• Is the knowledge generated or shared electronically recorded? (Office Applications, Data Bases, KMS,IS)</li> <li>• How frequently is knowledge generated or shared divulged?</li> <li>• How many organizational areas or levels have access to knowledge generated or shared?</li> <li>• How many system reports are used for decision-making?</li> <li>• How many system queries are used for decision-making?</li> </ul>
	Change management	<ul style="list-style-type: none"> <li>• What percentage of projects are related to organizational change and organizational change management?</li> <li>• How much time do project managers spend on organizational change?</li> <li>• How much is invested in organizational change projects?</li> </ul>
	Strengthening of Human Talent (HT) capacities	<ul style="list-style-type: none"> <li>• Do training plans for IT use exist?</li> <li>• How much is invested in training for IT use (%)?</li> <li>• What is the current stage of training plans on IT use?</li> <li>• Which organizational levels are involved in IT training plans?</li> <li>• Are there any motivation/training plans related to knowledge and/or knowledge management?</li> <li>• Which organizational levels are involved in motivation/training plans related to knowledge and/or knowledge management?</li> <li>• What is the current stage of the development of motivation/training plans related to knowledge and/or knowledge management?</li> </ul>
Knowledge flows	Effectiveness of knowledge flows in the organization	<ul style="list-style-type: none"> <li>• Is information/knowledge exchanged as stipulated in the standards and procedures?</li> <li>• Are IT used for exchanging information/knowledge between people in the course of work?</li> <li>• Are self-managed teams created and active in the organization?</li> </ul>
	Knowledge-based organizational culture	<ul style="list-style-type: none"> <li>• How varied are the mechanisms for compiling and sharing information in the course of work?</li> <li>• How often are these meetings held?</li> <li>• How often do managers attend meetings with the work teams?</li> </ul>
Information and Communication Technologies	Mechanisms to support the flow of knowledge	<ul style="list-style-type: none"> <li>• What percentage of people have Internet access?</li> <li>• How frequently do people access the Internet?</li> <li>• What percentage of people have access to the Intranet?</li> <li>• Is there a Website?</li> <li>• How much of the time devoted to sharing information/knowledge is spent on chatting.</li> <li>• What is the predominant criterion for setting up virtual communities? (by project, subject area, work team, organizational structure, as solicited, none)</li> </ul>



Factors	Indicators	Operational definition
	Existing systems and support hardware	<ul style="list-style-type: none"> <li>• How many information and/or knowledge systems are there?</li> <li>• How integrated are the existing systems?</li> <li>• What is the ratio between the number of portable computers and the number of people in the organization?</li> <li>• How many computers have the capacity to connect by wireless technology?</li> <li>• How easy are the existing systems to use?</li> </ul>
<i>External Factors</i>		
Knowledge society	Restructuring of organizations in the global context	<ul style="list-style-type: none"> <li>• How many national networks does the organization participate in?</li> <li>• How many international networks does the organization participate in?</li> <li>• How often are meetings with these networks' organizations held?</li> <li>• Are ICT used to exchange information/knowledge with other organizations?</li> <li>• Who many knowledge-based products and/or services are currently generated in the organization?</li> <li>• Are there currently any legal or regulatory frameworks that affect the exchange of information/knowledge with other organizations?</li> </ul>
	Development in the area of information and communication technologies	<ul style="list-style-type: none"> <li>• Is e-mail used to exchange information/knowledge with other organizations?</li> <li>• Are non-presential meetings supported by ICT (teleconferences) held?</li> <li>• Are inter-institutional portals used to exchange information/knowledge with other organizations?</li> <li>• Are there any plans to include emerging technologies?</li> </ul>
Image vis-à-vis the environment	Impact on clients	<ul style="list-style-type: none"> <li>• To what extent do the products and/or services generated influence the processes and activities of organizations in the environment?</li> <li>• Have mechanisms been defined to articulate with players in the environment of the organization?</li> <li>• Does the environment receive information on products and/or services on a timely basis?</li> </ul>
	Credibility and prestige	<ul style="list-style-type: none"> <li>• Are the products and/or services generated pertinent to the requirements of the organization's environment?</li> <li>• How sustainable do the people related to (affected by ) the organization (the organization's customers, etc.) perceive it to be?</li> <li>• Does the organization take part in activities connected with the society it evolves in, reaching beyond its specific areas of action?</li> </ul>

As can be seen from the above table, this study addresses those aspects aimed at supporting the organizational success of adopting knowledge reuse as a natural practice in the organization. The next methodological step is its assessment through a case study.

## Conclusions

Knowledge reuse is a challenge for today's organizations, which strive to remain active amid not just economic, but political, social and technological changes, which call for more work with fewer staff and the creation of business units for purposes connected with this research.

This paper proposes a CSF based model to gauge knowledge reuse in the first release. The model consists of Internal and External CSF, with their corresponding variables and operational definitions. These will enable the CSF to be measured in Venezuelan organizations.

This proposal is in line with the Venezuela's current circumstances and the problems faced by its organizations.

In order to evaluate this contribution, it will be applied to a Venezuelan scientific and technological research institution in the field of agriculture. Given the nature of this institution's processes and mission, knowledge constitutes an extremely important component.

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