COMPETENCES THAT MANAGERS SHOULD POSSESS – A CASE STUDY AT IPEN

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ABSTRACT

To guide human resources selection and development, organizations usually have a list of the competences they consider crucial for the various segments of their endeavor. At IPEN, a R&D institute with graduate teaching (within USP framework) and some production facilities, the elaboration of a list of the highly appraised competences for IPEN's managers become a research theme in itself. This work has produced: (i) a methodology to generate, validate and recycle periodically the list and descriptions of managers' competences; and (ii) the first version of the list. Delphi questionnaires were applied via web using "Lime Survey", a freeware that enables import and export the data as csv files and has a simple and workable language for database access. The consistency of the numerical results, as well as the consensus preferences manifested by the sample is discussed in the paper. Also a segmentation and multivariate statistical analysis to reveal differences and similarities among the various subgroups of the sample is presented providing a lot of insightful information. The merit of structuring the pertinence of the competencies according to seven BNQA's criteria is discussed. Combining the manifested preference of the sample with a factor analysis to check the most significant loads in each construct a reduced set of competences is proposed. This reduced set can be the base for IPEN's directors to select the crucial set of managers' competence. The methodology here explained can be used each two years to co-validate and update this reduced set.

1 INTRODUCTION

The real value of a corporation is not settled in its physical resources, but in human skills [01]. The value generated by intangible assets, like knowledge, will surpass the worth of tangible Brazilian society assets, in the next decade, changing the current 20%-80% ratio to 65%-35%. In the 1970's, this ratio was 05%-95%, when buildings, financial resources, products and equipment were the most valuable assets in an organization [02]. The growing importance of knowledge as a competitive advantage is already a fact and it is the reason why the companies are striving to maintain human competency management practices.

The capacity for innovation and the domain of technology are other key elements for the organization which needs to maintain their competitiveness in the global market. It is also a legitimate issue for a nation that seeks a prominent position in the globalized market.

The competence must include an ability to manage the cognitive process of an organization. Companies managers are, ultimately, responsible for deciding the ways in which a firm will try to create value in its targeted product market. Thus, achieving organizational competence poses a two-fold cognitive challenge to managers. They should be able to ascertain and assure that the firm operations meet, at least, the minimal efficiency requirements needed to carry out the strategies of the firm, but they should, also, be able to define and select strategies that have the potential to create value in targeted markets when they are conducted efficiently. In other words, managers are responsible for both efficient and effective use of organization assets [3].

The good relationship among workforces and work teams improves the collaboration capacity and makes easy partnership and leadership [04]. Managers usually appraise the adequacy of their collaborator's behavior in face of several unequal working conditions. As collaborators networks increase, new kinds of commitments and behaviors are required, which, also, increase their responsibility regarding results achievements. In short, much of managerial work is performed by means of interpersonal relations, leadership and relationship within the working team. The higher the managerial level, the worthier contacts with customers, suppliers, shareholders and interested parties are.

Human Abilities are one of the main contributing factors for organization effectiveness. Such abilities, or competencies, are the key values for an organization whose actions should be intensely guided for personal development.

The British vision on the notion of competencies privileges the professional profiles identification that is the basis for human resources training and certification programs. In this context, the emphasis is forwarded to the official tasks, whereas the definition of competencies is related to expected results, translated by performance indicators and fixed by the production structure [5].

The discussion on the competence model occurred in the years 80´s, influenced by the crisis of the capitalism in the 70´s. The answers of the capital to its structural crisis can be dimensioned by the reforms undertaken in the own productivity concepts, based on the flexibility of the form of production and new ways of workforce management [6].

The human resources systems driven to the competencies should be connected to the work functions and reflect essential abilities, capacities, values and priorities. The organizational capacities are developed collectively inside the organization, under the premise of individual competencies development [7].

French authors have contributed significantly when they rescue other dimension of competency components. They recognize that, despite the person holds the necessary attributes to the function and knows the expected results, there is not any guarantee that the competence will support this job in an adequate way [5].

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Observing the evolutionary process, it is noted that organizational competencies tend to be characterized as contributions of the people to the company capacity to interact with business environment, in order to maintain or improve competitive advantages [8].

The purposes of this work are to appraise a set of managerial competencies and develop a methodology to produce them, in compliance with IPEN objectives and structured according to seven BNQA's criteria.

2   METHODOLOGY

This work started with visits to the organizations carrying out activities similar to IPEN, which have mapped their managerial skills; a list of 99 competencies was collected. Based on the list of competencies gathered from those organizations, a methodology to map the managerial competencies was developed, in compliance with IPEN strategy planning and main goals. The competencies were mapped under BNQA criteria and appraised by the advisor boards by means of Delphi questionnaires.

The methodology of this work is schematically represented in Fig. 1.
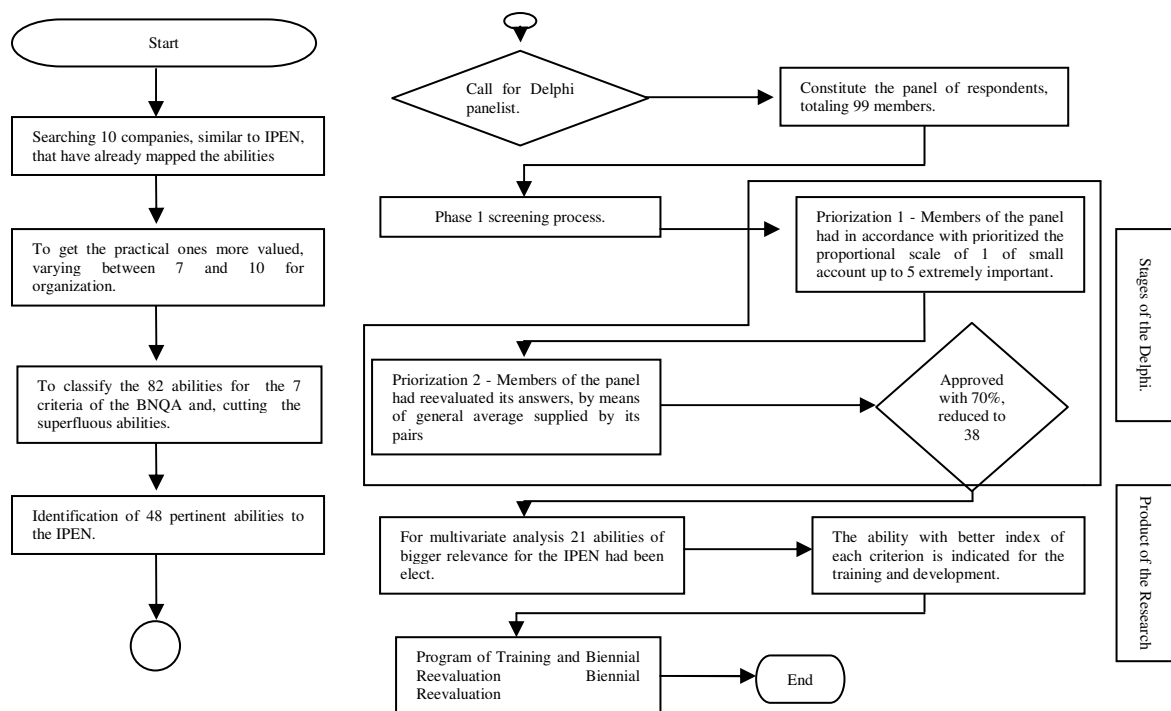
Figure 1. Methodology Scheme.

2.1 Validation

A committee formed by IPEN managers, doctor and master degrees titleholders, directors and former directors, and with special participation of a Professor from Economy and Administration Unit of São Paulo University, totaling 16 members, examined the rough list of 82 abilities and reduced it to 48 items. The committee has also: (i) examined if these initial 48 abilities were properly classified under 7 criteria from BNQA; and (ii) verified and corrected ambiguities or inconsistencies concerning their adequacy to IPEN main activities.

The initial set of 48 abilities was evaluated by a screening process followed by a Delphi survey method in. For such purpose, a respondent's panel was established. The panel comprises 99 members which are IPEN workers, closely connected to this subject and formed by present and former directors, center managers, division and service heads, young talents and emerging leaders.

The elicitation of the most important abilities was performed in 3 phases, as it follows:
Phase 1 – a one pass, 70% minimum bar, screening process;
Phase 2 – a two-run Delphi process managed to produce consensus on the competencies that is considered the most relevant; and
Phase 3 – data analysis and rerun of constructs that were found not so well posed.

2.2 Screening

In the screening phase, it was asked in the respondent panel the question, "Considering the global Strategy of IPEN, whose description formulated by the Director Plan 2007-2010, are available to all employees in the intranet, please select, at least, one competence, from each BNQA criteria, which is pertinent to fulfill the manager requirements?"

2.3 Two Run Delphi Questionnaires

In this appraisal phase, first run, it was asked to the respondent panel to express their opinion: "Considering the resultant list of abilities, selected by the panel in the screening phase, evaluate each one according to the following intervallic rank, from grade 1 = not important to grade 5 = very important."

In the second run, each member of the panel was asked the same question submitted in the first run but followed by the score assigned by them, in the previous run, and the average grade of the entire panel, to deepen the consensus of the appraisal.

In the Screening and Two-run Delphi phases, the Delphi questionnaires were sent to the panel member with the aid of LimeSurvey open source program [9]. The results were tabulated in excel spreadsheet and statistical analyses were performed by means of Minitab-15 program, under license given by the University of São Paulo.

2.4 Data Analyses and Rerun

From the respondent panel of 99 members, 82 attended the 1st run of Delphi process and 84 attended the 2nd run questionnaires. The answers resulted in a matrix of 38 columns of competencies or abilities and 84 rows of numerical ranks.

The averages and standard deviations for 38 competencies were determined. The standard deviation ranged from 18% of the mean value up to 26%, with variations that may be attributed to diversified academic background of the respondents, who are holders of distinct levels of managerial attributions. The competencies, grouped under a BNQA criterion, should have represented properly the content and significance of what was assigned in that particular step. When this did not occur, the respondents could have been induced to make misinterpretations or misevaluations and produce some spread or inconsistent assessments. This inconsistency can be estimated by means of a statistical parameter, the Chronbach α.

Besides estimating the consistency among competencies grouped inside a BNQA criterion, the Chronbach α can, also, estimate consistency in groups or classes of respondents, e.g., among respondents composed by heads of divisions and services. The consistencies of the numerical data, gathered from the 2nd run of Delphi process, have been evaluated stratifying the competencies under BNQA criteria and stratifying the respondents by managerial classes and academic profiles. The consistencies of the experimental data estimated by means of Chronbach α in a stratified group are shown in table 1, below. When this consistency parameter reaches a value higher than .70, the experimental data are normally considered consistent and reliable.

Table 1 – A consolidated view of consistency parameters

Criterion	Overall	Group 1	Group 2	Group 3	Group 4	Group 5
BNQA	Consistency Parameter (α de Chronbach)					
Overall		0.97	0.94	0.96	0.95	0.94
Leadership (C1 to C10)	0.86	0.84	0.89	0.84	0.85	0.85
Strategy and Plans (C11 to C13)	0.50	0.63	0.50	0.55	0.60	-0.15
Costumers (C14 to C16)	0.87	0.94	0.85	0.92	0.91	0.63
Information and Knowledge C17 a C21	0.75	0.76	0.66	0.84	0.75	0.74
Persons (C22 to C28)	0.83	0.84	0.75	0.89	0.84	0.78
Processes (C29 to C30)	0.72	0.84	0.82	0.71	0.79	0.44
Results (C31 to C38)	0.89	0.94	0.89	0.94	0.92	0.85

In the table above, in the column for group 1, the consistency parameters for each of the BNQA criteria are estimated for a stratified group of respondents, with former and present directors and center managers. Group 2 is formed by chiefs of divisions and services, group 3 by young talents and emerging leaders. In groups 4 and 5, the respondents are stratified, respectively, by respondents who have technical academic degrees and by respondents who have administration professional profiles. In the overall column, the consistencies of the experimental results were estimated for each PNQA criterion, considering the scores given by all the members of panel.

In the 1st row of Table I, it can be seen that all of the 10 competencies, which belong to the Leadership Criterion of BNQA, were consistently evaluated by the total members of the panel and by the stratified groups. The same consistencies are observed for the competencies which belong to the remaining BNQA criteria, except for those belonging to the Strategy and Plans criterion. Therefore, in the Strategy and Plans rows of table 1, all consistency parameters represented by Chronbach α are lower than .63, whereas values higher than .70 are shown in the remaining rows, except in the last column of the Process criterion row.

The only unsatisfactory result observed was for Processes criterion group of competencies, evaluated by Group 5 respondents, which was formed by professionals of the administration area: this result was not considered surprising, because processes activities in the nuclear area are strictly technical. Therefore, such competencies related to technical activities may have been evaluated by the administrative personnel under a biased view, causing some misinterpretation of strictly technical abilities.

After all, the experimental results presented in table I were considered acceptable and reliable, except those for the Strategy and Plans criterion row. Consequently, it was decided to rerun the process of phase 2, only for competencies of Strategy and Plans criterion, whose definitions were revised and improved.

The rerun was performed in 2 runs, when 69 members of Delphi panel evaluated the 3 revised competencies of this criterion; the results are shown in Table 2.

Table 2 – Consistency Parameters of Rerun

Criterion	Overall	Group 1	Group 2	Group 3	Group 4	Group 5
BNQA Strategy and Plans C11 a C13	Consistency Parameter (α de Chronbach)					
	0.50	0.32	0.50	0.57	0.59	0.30

Table 2 shows that the re-evaluation resulted in very small improvement over the previous data, except for group 1, although the consistency parameters remained below 0.70. For group 1, the parameter dropped from 0.63 to 0.32, what was considered an expected result, because, for the rerun, this group had a small number of respondents. Thus, the revised versions of the 3 competencies belonging to Strategy and Plans BNQA criterion were considered acceptable, for the purpose of this work.

The 38 competencies, whose relevancy was consistently appraised by the respondents of Delphi panel, have become object of the next steps of this work: a) to elicit a best Competency for each BNQA criterion; and b) to select a set of the most relevant competencies to be adopted by IPEN, for further human resource development programs.

For both purposes, it was decided to establish the elicitation methods considering the experimental data collected in the Phase 2 process. Firstly, the highest average score was considered under the group of each BNQA criterion, which resulted in a set of the 7 best competencies. The remaining competencies were classified in decreasing order. Secondly, the scores inside each group were analyzed by means of multivariate statistical analysis, where PCA, principal component analysis, was performed.

In the group of Leadership criterion, for example, the evaluation of the 10 competencies belonging to this group generated 10 eigenvectors and corresponding eigenvalues. The eigenvectors were placed in decreasing order of explained variability of sample space (84 respondents in most cases). Taken the cumulative sum of the explained variability and stopping after pass 90%, the other eigenvectors were disregarded. The contribution of each competence to these set of normalized eigenvector can be measured as their projections to each one of these eigenvectors. Using this procedure the competencies were ordered, with largest contributing competence on top and successively the others until the least contributing competence.

The set of competencies classified in decreasing order by the Delphi's average criteria was compared with a set of competencies classified in decreasing order by PCA criteria. The competency satisfying better compliance simultaneously by Delphi's average and PCA criterion was elected as the best one inside Leadership criteria and the remaining competencies were classified in decreasing order. This joint classification was used to reduce the set of competences to a more manageable size.

The same procedure, as described for Leadership criterion, was repeated for each of 6 remaining BNQA criteria. As the final results a list of 7 competencies, the best managerial competency for each BNAQ criterion, was established and a set of 21 the most outstanding managerial competencies were selected.

3   CONCLUSION

The present study attempted to identify which competencies, perceived by IPEN managers, comply with the necessary requisites to adequately perform all the functions demanded by this nuclear institution.

For this purpose, this work was developed with the help of 65 formal managers and 34 emergent leaders, whose functions follow the integrated management model to fulfill the institutional goals.

The research succeeded to collect statistically consistent and conclusive data, what can be useful for the managers training programs based on the identified abilities and skills.

Considering the BNQA criteria, however, the competencies belonging to the Strategy and Plans criterion have not shown good statistical consistency of the experimental data.

Typically, the members of the appraisal committee may have difficulties to figure out strong compliances of those competencies with the Strategy and Plans criterion, since they were conceived by foreign organizations. On the other hand, it may be a clear symptom that the competencies for this criterion should be figured out strictly towards IPEN strategy and plans. In fact, IPEN develops very special activities which involve scientific and technological developments, summed with production and services responsibilities.

The proposed set of 21 competencies shall be re-evaluated each 2 years in order to create favorable conditions for the integrated human resources developments, in all management levels of IPEN. For that purpose, it is being proposed a human development plan based on this work and driven to the strategy of Brazilian nuclear science and technology goals.

The implementation of above proposed plan will help IPEN to create real condition to achieve the planned strategic goals. The set of the most valued competence for each criterion (7 competencies), elicited in this work, are described in the next paragraph. The promotion of management abilities and skills that compose such set could contribute to make better use of the existing talents and increase their effectiveness for the exercise of management.

01 - Leadership: Capacity to inspire, to motivate, to develop and to lead people for the achievement of goals and high performance. It includes keeping a collaboration environment and plenty use of the team member potential, in alignment with the strategies of the organization.

02 - Strategic performance: Is Able to formulate the planned action for the success of the strategies of the company. Has the capacity to opportunely adjust the plans according to the evolution of the scenarios and its impact on competitive positioning of the Company. Acts taking in account the consequences for all the interested people is aware and perceptive to the people and sectors, relievable with complex situations. Understands the trade, internally and the externally, and accounts key factors to formulate strategies and solutions to add value to the organization.

03 - Focus in the Customer and the market: Is capable to identify and to understand the necessities of the customers and the markets, current and potential, aiming at to anticipate and to develop new opportunities to the organization and to fortify the already existing relations. It implies in taking in account the excellent characteristics of the products and services that add value to the customer relationship and intensify its satisfaction.

04 - Communication: Says and writes objectivity and clarity, with opportune and assertive remarks, guaranteeing the understanding of the listener.

05 - Management of People: stimulates, promotes and follows up the development of the people. Is objective, clear, and concise and make sure that has well understood by the target people. Enhances group spirit for the attainment of collective goals, stimulates dialogues, mutual support and responsibility and shares the successes and the errors. Creates group synergy, for attainment of collective goals, works cooperatively, shares knowledge and valuates the potential of team contribution to achieve the common objectives.

06 - Creativity: Presents capacity to develop creative solutions and innovative and realistic approaches for the solution of problems and continuous improvement of products and organizational processes. Is detached of paradigms and preexisting mental models, and

interprets situations and to create unusual solutions. Has critical, quarrelsome and entrepreneurship spirits and acts to create new opportunities or to prevent future crises.

07 - Management of Changes: Is capable to identify the necessities of changes and to elaborate an action plan to implement them, aiming at to attain the necessary results for the achievement of the strategic objectives of the organization.

Finally, the continuity of this work is being stretched, closing on the competencies more connected with the market requirements, to describe and define the abilities and skills under the point of view of human resources management strategy, capable to fulfill IPEN targets: research activities, technology developments plus application and production activities.

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