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Relevance of In-house Publications in Knowledge Management: A Case Study from Naval Physical and Oceanographic Laboratory

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ABSTRACT

Several aspects of knowledge management in R&D institutions have been studied and reported by researchers in the past. However, studies on the relevance of in-house publications have not been reported so far. In-house publications have a significant role to play in effective knowledge management, especially in large R&D institutions. Such institutions generally have a compartmentalised structure, wherein each compartment delves deeper and deeper into areas of their own interest and expertise. As the depth and detail of the subject under study increases communication between the compartments becomes weaker. Dialogues within the compartments become jargon-ridden and incomprehensible to those belonging to the other compartments. In organisations with thousands of employees, distributed in several branches, situated in geographically distributed locations, communication of the knowledge generated at one place to another pose lots of problems. In-house publications are one of instruments that seek to correct this situation to a significant extent. To communicate the right information to the right people needs careful handling of the subject at corporate level. Subsequently, the number of in-house publications may become quite large. This article presents the case of Naval Physical and Oceanographic Laboratory at Kochi, India, which resorts to several in-house publications for effective knowledge management within the organisation.

Keywords: Knowledge management, in-house publications, R&D organisations

1. INTRODUCTION

Knowledge management (KM) is generally discussed in literature in business contexts wherein knowledge is seen as a tool in the hands of commercially operating companies to deliver their products and services more effectively. The metric for effectiveness in such cases would essentially follow the profit-and-loss account statements of the company. Several authors have studied the KM issues in the R&D department of such companies, in the background of changes in the business environments. Although much less prevalent, another model of R&D institutions also exist, wherein the R&D function and the business (commercial) function are delinked and operate independently. Metrics for gauging the performance of the R&D function becomes more complex in such cases. Obviously, such models can exist mostly in the government sector, wherein the resources for the R&D activity come from the public exchequer. To analyse the functioning of these kinds of organisations it is meaningful to assume that knowledge generation itself is the key function of the organisation. The KM thus becomes a much more important aspect of running the organisation.

Several methods are adopted for KM in R&D institutions, including those in the government sector mentioned above. Issuing of periodical in-house publications is one among these. Although several aspects of KM have been studied in detail by various authors in the past, the specific role of in-house publications seem to have gone un-noticed. In this paper, an attempt is made to bring out the relevance of in-house publications in the KM of R&D organisations in the government sector, by making a case-study of Naval Physical and Oceanographic Laboratory (NPOL), Kochi.

2. LITERATURE REVIEW

Several aspects of KM in R&D organisations have been studied and reported earlier. Almost all of these are from the commercial world, in the sense that the R&D organisation under study is part of a commercially operating company. The background for studying the KM issues are of commercial nature – such as 'intensified competition, a splintered mass market, shortened product life cycles, and advanced technology and automation, etc.' Drongelen,[1] *et al*., have reviewed these several years back. The activity of the R&D department is seen as "information transformation processes, transforming information about client orders,market demands and technological advancements, into product and process designs as observed by Souder[2]. Nederhof[3], *et al*. states that improvements in R&D activity can be brought out by improving the quality of the information inputs, or by enhancing the ability of the R&D function to convert information into quantifiable outputs. A major part of such information inputs needed for developing products and processes are assumed to be available within the company, "stored in the minds of people, in archives, in procedures, in equipment, etc." Drongelen[4], *et al*.,

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have made detailed analysis of the KM issues in such contexts.

Nonaka[5] has identified four modes of knowledge creations such as socialisation, extenalisation, internalisation and combination. Publications are means of externalisation of knowledge and they contain explicit knowledge which can be well-organised and kept for future reference. This is valid for all kinds of organisations, including R&D and therefore assumes a lot of importance in the whole gamut of KM. However, there is not much literature available on the specific role of publications in KM. Ermine[6] stated that "some knowledge is codified in new records (publications, reports, documents etc.), it is explicit knowledge". He also stated that "the necessary reference documentation consists of: The documents on organisation (missions, organisational charts, descriptions of activity, portfolio of activities, etc.); documents concerning production (publications, studies, activity statements, etc.); strategic documents (mid-term plans, summaries of previous mid-term plans) and; quality documents". Specific attention to the relevance of publications has not been attempted in this study.

Relevance of technical communication to knowledge management in an R&D perspective has been studied and reported a few years back by Ravi[7]. It is stated that "In R&D organisations, like in any other knowledge creation process, only a part of the new knowledge gets recorded in documents and becomes explicit knowledge which others can refer to for enhancing their own knowledge". The study looks at the communication of the hard-core technical knowledge that gets created through the R&D activity.

In-house publications are of a different category by itself and are not confined to technical knowledge. As Kalam[8] puts it,"Knowledge in any form, tacit or explicit, is important. The future world would be dominated only by knowledge." The KM requires capturing of tacit knowledge of the organisation gained and built through years of experience. "Tacit knowledge has to be captured by proper documentation, through mentoring, interviews and surveys."[9] Since all are not expected to capture all the knowledge around, documentation should be such that the required information only reaches the respective persons. In-house publications take ample care of this aspect.In-house publications have a significant role to play in effective KM, especially in large R&D institutions. R&D institutions,generally, have a compartmentalised structure, wherein each compartment goes deeper and deeper into areas of their own interest and expertise. As the depth and detail of the subject under study increases communication between the compartments becomes weaker. Dialogues within the compartments become jargon-ridden and incomprehensible to those belonging to the other compartments. As the size of the organisation becomes bigger, compartmentalisation becomes too tight and what remains common between the employees get restricted to their service matters. When personnel from two branches of the organisation meet, they have mainly non-technical matters to discuss. In-house publications are one of the instruments that correct this situation to a significant extent.

In organisations with thousands of employees, distributed in several branches situated in various geographical locations, communication of the knowledge generated at one place to another poses lot of problems. Obviously, everybody need not know everything. To communicate the right information to the right people needs careful handling of the subject at corporate level. Subsequently, the number of in-house publications may become quite large. In the following sub-sections, the significance of in-house publications in the case of a Naval Physical and Oceanographic Laboratory (NPOL), India was examined.

3. ABOUT THE ORGANISATION

NPOL is one of the very successful R&D laboratories under Defence Research and Development Organisation (DRDO), Govt. of India. DRDO has 52 laboratories and institutes under its administrative control, which are situated in different parts of the country. Nearly 6000 scientists work in these institutions. NPOL is situated in Kochi, Kerala, and is one of the three laboratories working towards meeting the various needs of the Indian Navy. NPOL has about 241 scientists and engineers, another 243 technical officers and about 100 administrative staff. Nearly one-fourth of this is women employees. The core strength of NPOL is in the area of design and development of underwater surveillance systems. Systems designed by NPOL get manufactured by large production agencies such as Bharat Electronics Limited (BEL), Larsen & Tubro Limited (L&T), etc., who sub-contract several smaller companies for component manufacture. Indian Navy has fitted a large number of NPOL-designed surveillance systems on board naval vessels, which are known to be performing very well. Its current annual expenditure is about 1.25 billion Indian Rupees.

NPOL has used in-house publications as very effective tool for knowledge management. There are at least five different levels of in-house publications, which seek to cater for different groups of people and therefore have different levels of contents and presentation styles. Figure 1 illustrates the reach of each of these publications.

4. OBJECTIVES OF STUDY

The objectives of this study are to:

- Assess the role or relevance of in-house publications in knowledge management
- Understand how organisations can record and communicate their knowledge through in-house publications
- Study the role of in-house publications in enhancing the knowledge of employees
- Evaluate the attitude of employees towards reading in-house publications

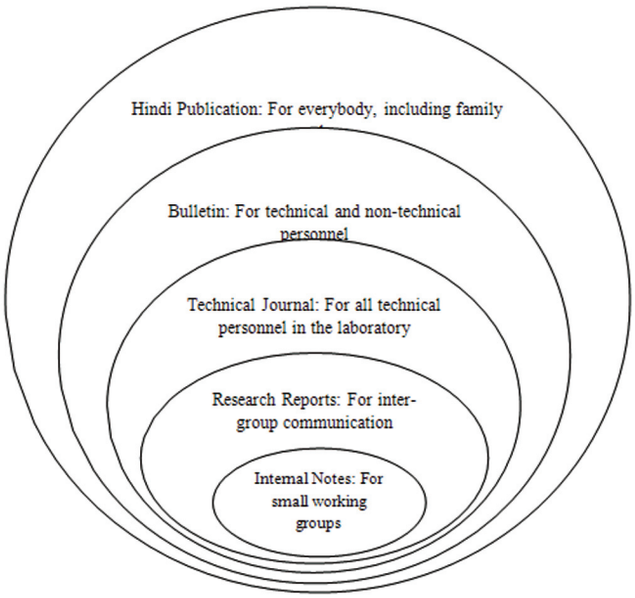

Figure 1. Coverage of the various levels of internal publications at NPOL.

5. METHODOLOGY

The present study is confined mainly to the scientists and technical officers of the Naval Physical & Oceanographic Laboratory, Kochi. The study was based on survey method and questionnaires were used as the tool to collect data. A structured questionnaire was designed, keeping in view the basic objectives of the study. Separate questionnaires were designed for each publication. Surveys were conducted among the readers, to assess the relevance and usefulness of these publications. Major conclusions of these surveys are presented in this paper.

The in-house publications brought out regularly by NPOL were selected for the study.

6. IN-HOUSE PUBLICATIONS OF NPOL

At NPOL the publications which are brought out in regular intervals are known by the following names:

(1) Internal notes

(2) Research Reports

(3) Technical Journal

(4) Bulletin

(5) Hindi publications

6.1 Internal Notes

Internal notes issued within a working group or division viz., 'Division notes' is probably the zeroth level of in-house publications. This is meant for a small group of 10-30 people and would, in general, discuss the subject in a fair amount of detail. The group generally has a similar background and experience, say mechanical engineering, analytical chemistry, etc., Groups would consist of different teams, working on different type of tasks. Since all the working teams remain busy in their own work, it is difficult for them to get to know what their other colleagues are doing. Internal notes are excellent devices to bridge this gap. Figure. 2 shows the cover page of a division note from NPOL. This is issued monthly and contains full details of all the technical work being done by the different working teams under the division. Circulation is restricted to within the group. The contents are reviewed by the Division Head and number of pages are generally 20-30.

Figure 2. Internal Note.

Internal notes are very useful as work records of all the division members. Each division member becomes aware of what the other members are working on and how fast/slow others are progressing. This induces a small degree of competition among the division members, which, in turn results in documenting each and every little piece of work done by them. This is important for posterity-a small piece of work initiated today and left inconclusive may turn out to be great importance in future. Unless it is properly documented, efforts will be wasted in re-inventing the wheels

Another important aspect of the Division Notes is that it makes all the division members aware of other member's work. This is very much required at the end of the year, when annual performance appraisals are carried out. When everybody knows what others have achieved, each person evolves a mental picture of themselves, relative to the others. This facilitates in easier acceptance of performance appraisal feedbacks. Moreover, to implement concepts like '360-degrees feedback' wherein everybody is asked to evaluate everyone else in the division, all are required to have a fair amount of understanding of other's work. Division Notes facilitates this. At least one division in NPOL has made good use of the internal notes as instruments for dissemination of knowledge generated in different research efforts among peers.

The survey was conducted among total employees (22) of a single group and the results indicated that the internal notes do serve the intended purpose of knowledge dissemination within the group. 72 % respondents said that they speed-read all the articles appearing in the Division Notes. 58 % said that the Division Notes helped them in effectively participating in reviews and 86 % said that they could do a fair job in providing '360 degrees feedback' because of the Division Notes. Although there are different perceptions about looks and periodicity of the document, its usefulness was acclaimed by a large percentage of the division members.

6.2 Research Reports

Next level of in-house publications at NPOL is the Research Reports (RRs). These are also fully technical and released in a formal manner after refereeing by experts, approval from the highest authority etc. The contents of the RRs are sufficiently descriptive, with proper introduction, etc. so that readers from various backgrounds can comprehend easily. However, it is not meant for a person who is new in the area. Figure 3 shows an example cover page of a Research Report. Research Reports contain the ultimate essence of the R&D efforts being made in the laboratory. Number of pages are generally between 20-50.

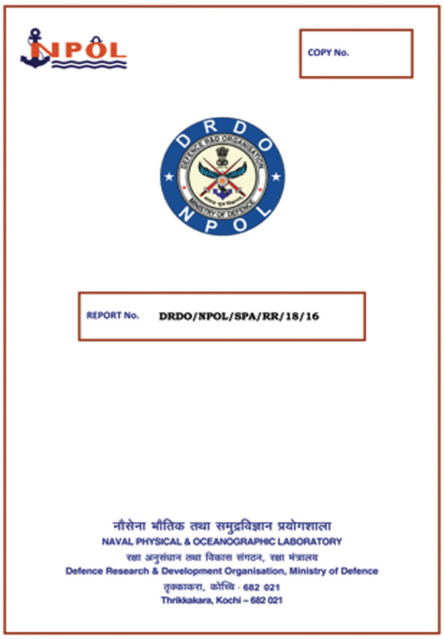

Figure 3. Research Report.

The usefulness of RRs is mainly as reference documents for system designers and researchers. Since these documents come with detailed introduction and also undergoing a refereeing process, they are sufficiently authentic to be referred and quoted. It can be noted here that internal notes are more of work records and results therein cannot be directly used by others, without cross-checking with the authors. It is quite likely that a particular conclusion made in a note has been changed/modified significantly in a later note, which is not generally the case with RRs. Since the users of RRs are mainly scientists, a survey was conducted among scientists. A sample of 100 scientists which comprises 41 % of total scientists of NPOL were selected. The results showed that about 75 % know that RRs are available online in Technical Information Resource Centre (TIRC) portal but the preference for reading is hard copy. 85 % respondents said that they read at least one RR in a year. 35 % do not read RRs fully; they read only the chapters/sections relevant to their work. 60 % said that the RRs helped them in carrying out their assignments, while 30 % were not sure about it.

6.3 Technical Journal

Another level of technical communication needs to take place between the internal notes and RRs. NPOL's half-yearly technical journal, '*Sea Tech*' caters this requirement. It is a bi-annual journal, released as a general issue and as a special issue focusing on the activities in a particular area. '*Sea Tech*' captures some of the important technical achievements from different groups and presents in a concise form, omitting the elaborate ones. These are also refereed documents and hence authentic. This is a peer-reviewed journal. The journal helps the authors to increase their ability in writing research articles while other employees of NPOL get an opportunity to read about the work of their colleagues. No. of pages are generally 50-60. All the journal issues are made online through intranet.

Figure 4. '*Sea Tech*' technical journal.

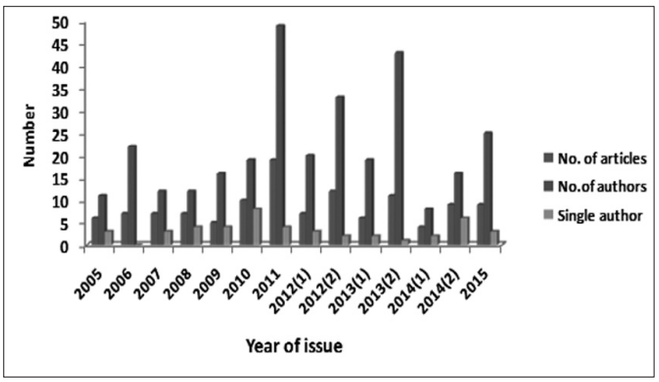

Figure 5. Number of articles and authorship pattern of the journal '*Sea Tech*'.

'*Sea Tech*' is accessible (on request) to other DRDO laboratories as well. Figure 4 shows cover page of one of the issues of '*Sea Tech*'. Authorship pattern and number of articles published in each *Sea Tech* illustrated in Fig. 5. The graph clearly shows that the scientists understood the importance of knowledge sharing and more and more articles were published in the journal. Number of authors also have increased over time.

A sample of 225 scientists and technical officers was selected considering the fact that they are the user community for the journal which comprises of 46 % of total scientists and technical officers of NPOL. The survey results showed that the preferred way of reading '*Sea Tech*' is hard copy for 80 % of the respondents even though 90 % know that '*Sea Tech*' is available in TIRC portal. 70 % of the respondents were aware of the impact of publishing their articles in '*Sea Tech*' on their career prospects. The survey also showed that about 30 % of the respondents have published their articles in *Sea Tech* and 70 % have not yet published.

6.4 Bulletin (Non-technical Publication)

Knowledge, in an organisational setting, is not only technical, even in the case of R&D organisations. The type and variety of non-technical activities being undertaken in an organisation reflects the progress of the organisation. Without communicating this, the organisational communication remains incomplete. At NPOL, the half-yearly bulletin, '*Sea State*' (Fig. 6) is released towards meeting this objective. The contents are mostly general-main events that happen in the laboratory, visits, celebrations etc. Some of the technical achievements, which can be readily appreciated by common man, are also included. This is distributed to DRDO Headquarters as well as all other DRDO laboratories. The *Sea State* is released in Hindi also, to ensure wider readership. Contents of *Sea State* are reviewed and edited by Director and the Editorial Board. Number of pages are generally 10-20.

A sample of 177 employees including scientists, technical officers and administrative staff was selected as this is a general publication. This is about 30 % of total population of NPOL. 75 % of the respondents said

Figure 6. *Sea State* bulletin.

that *Sea State* is where one can see all NPOL news at one place. 56 % said that they read all the articles in *Sea State*, while 25 % said that they read only those sections that they find interesting.

6.5 Hindi Publications

In all communications at NPOL, Hindi assumes an important role, since it has been identified as the language of the administration (Raj Bhasha). Newsletters and annual magazines in Hindi are released with the specific objective of promoting Hindi as an official language. NPOL's Hindi newsletter is '*Pavan*' which is half yearly and annual magazine is '*Lahar*'. These are platforms for expression of artistic and literary talents of the larger NPOL community, which includes the family members of the employees also. From the family members of the security staff right upto the associate directors, all the members of the NPOL family show their presence in *Lahar*. '*Pavan*' is a newsletter designed to disseminate information regarding the specific initiatives taken up for promotion of Raj Bhasha. Figure 7 shows the cover pages of issues of '*Pavan*' and '*Lahar*'. Hindi publications are reviewed and edited by the Hindi Cell, NPOL and additional checking is done by an external language expert. *Pavan* is typically less than 10 pages where *Lahar* runs into 60-90 pages.

Survey was conducted among all employees and the sample covered is 150 employees which comprise

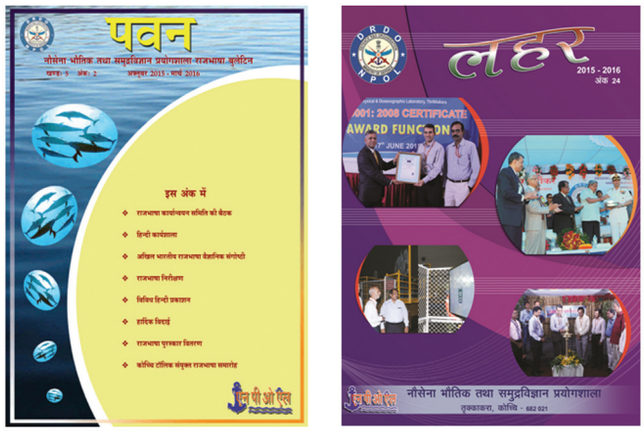

Figure 7. Hindi publications.

25 percent of total population. 67 % of the respondents said that Hindi publications help to promote use of Hindi as an official language. The respondents also considered the Hindi publications as recreational material. 40 % of the respondents have contributed to these publications at least once. The survey results also showed that more than 93 % of readers prefer hardcopy to read.

7. CONCLUSIONS

Although several aspects of knowledge management in R&D organisations have been earlier studied by researchers in the past, the role and impact of internal publications have not been studied and reported earlier. In this study, an attempt is made to assess the role of internal publications in a particular R&D organisation, viz., Naval Physical and Oceanographic Laboratory. Previous works related to this have been briefly reviewed in the introduction. Relevant details regarding the laboratory have been mentioned. Structured surveys have been carried out among members of the organisation to get a quantified idea of the role of the different internal publications. Results have brought out that there is a significant role for the internal publications in the knowledge management in the organisation. Although it was not included explicitly in the surveys, the respondents of the surveys also provided an input as to which area of the organisational activity was still not covered by the existing publications. Accordingly, it was suggested that another publication, specifically covering the management aspects, also shall be brought out.

As future research work, it is proposed that studies of the role and relevance of internal publications in larger R&D organisations may be taken up and attempts can be done to quantitatively relate this to the performance parameters of the organisation.

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Shri S. Anantha Narayanan, Distinguished Scientist, has retired as Director, NPOL in February 2015. He holds BTech (IIT, Chennai) and ME (Indian Institute of Science, Bangalore). After working for a few months with Keltron, he joined DRDO in 1975 at DRDL, Hyderabad and started working on Inertial Navigation Systems. In 1978, he got transferred to NPOL and since then he had been working in the area of sonar systems development. He was a team member of the first NPOL sonar project, APSOH, during the period 1978-1985 and then the advanced version, HUMSA. Later, in 1993, he became the Project Director for the first indigenously developed submarine sonar system PANCHENDRIYA. At NPOL, he had taken up various technical as well as organizational positions, finally rising to the position of the Director in 2007. His tenure at NPOL as Director is marked with several new initiatives in technology development. He was conferred with the '*DRDO Technology Leadership Award*' in 2013. Earlier, in 1995, he had won *DRDO Scientist of the Year* award also.