Malaysian Management Journal 1(2), 51 - 57 (1995)

R&D Screening Process: The Commercial Viewpoint

CHAN KOOK WENG
Guthrie Research Chemara, Malaysia.

ABSTRAK

Proses penapisan R&D adalah komponen penting dalam mana-mana organisasi R&D dan perlu dilakukan secara berterusan. Di Guthrie Research Chemara, penapisan seperti ini penting bagi penyelidikan mereka. Penapisan R&D mempunyai nilai langsung dalam membuat keputusan, iaitu, menentukan cadangan penyelidikan yang mana patut dimuatkan dan yang mana dikeluarkan daripada program R&D, yang lambat laun akan mempengaruhi strategi korporat syarikat tersebut.

Penapisan melibatkan keseluruhan bidang penelitian dalaman dan luaran sebelum projek cadangan R&D disenarai-utamakan, diterima dan seterusnya dilaksanakan. Juga salah satu unsur utama proses penapisan ialah pengiraan kos dan keuntungan projek cadangan kerana ianya membantu dalam proses pengkomersialan sesuatu penemuan R&D dengan cepatnya.

Kertas ini memaparkan beberapa pengalaman Guthrie Research Chemara tentang betapa perlunya penapisan R&D untuk penyelidikan yang berkesan.

ABSTRACT

The process of R&D screening is a very important component of any R&D organization and must be done continuously. At Guthrie Research Chemara, such screening has been an integral part of research. R&D screening has a direct value in making decisions as to which research proposals should be included in or excluded from R&D programs which, eventually, will influence the corporate strategy of the Company.

Screening involves a whole range of internal and external vetting before justified R&D proposals are prioritized, approved and implemented. Also, one of the major elements of the screening process, the cost and profit calculation of research proposals, greatly assists in the rapid commercialization of R&D findings.

This paper relates some of the experiences from Guthrie Research Chemara on the usefulness of R&D screening for effective research.

INTRODUCTION

The growing of the three core plantation crops, cocoa, oil palm and rubber, is a business concern. In business, inferior technology cannot compete with superior technology at the same price level, and the latter alone is insufficient when other factors like timeliness and quality, which also determine success, are not adhered to. The technological advantages arising from agricultural R&D innovation are an important part of the plantation business system. These advantages need to be integrated with production, marketing, finance and personnel to form a balanced system. As such, the process of R&D screening plays an equally important role in ensuring that research proposals have a chance of ending up as innovations that can be commercialized.

COMMERCIALIZATION OF R&D INNOVATIONS

For commercialization of R&D innovations, four basic concepts have been proposed:

1. Any new venture arising from technological innovation can become a possible new business after the necessary risks of developing the product and creating a new market are taken.

2. The types of innovation, spanning the entire range of activities from the creation of new knowledge to the implementation of new processes, may be either radical or incremental but both are opportunities for corporate diversification.

3. A corporate strategy that looks at future productivity is directly dependent on long term research which considers the impact on corporate earnings five to ten years into the future.

4. The R&D set-up and infrastructure of any research organization must change to enable it to influence the competitiveness of the Company and thus the competitiveness of the country.

Innovations are therefore the starting blocks in the commercialization of research findings into new businesses.

ROLE OF R&D SCREENING IN POLICY FORMULATION

Guthrie Research Chemara was established in 1929 by Kumpulan Guthrie Berhad which was founded in 1821 as a trading company in Singapore. The Company ventured into mainland Malaya to become agents initially, and owners subsequently, of rubber, oil palm and cocoa estates. Today, the Company is the largest privately owned plantation group in the country with about 110,000 hectares of its own land and another 150,000 hectares under its advisory services.

Due to the low rubber prices in 1929, Guthrie Research Chemara was first directed to improve earnings by overcoming the poor yields of rubber. They were also asked to look into the R&D programmes for the planting of oil palm as an alternative to rubber. Over the years, Guthrie Research Chemara expanded from a basically agricultural research station to eventually include agribusiness and manufacturing research in the Eighties.

At Guthrie Research Chemara, their 14 R&D Sections have been grouped under three research departments so as to concentrate the strengths in these areas. These departments are best suited to set their own priorities and research directions. They are:

o The Agricultural Research Department, which consists of five Sections namely Administration, Cocoa Research, Crop Protection, Oil Palm Research and Rubber Research. As the Plantation Division is the major customer, these five R&D Sections report to the Director of Plantations.

o The Manufacturing Department, which has three Sections, namely Technical Services for Cocoa, Palm Oil and Rubber.

o Agribusiness, which is actually composed of two Departments, Food and Non-Food. Under the Food Department, there are four Sections namely Livestock Research, Aquaculture, Biotechnology and Food Technology and Development. The latter includes the fruit crop development and mechanization units. The Non-Food Department, has two Sections, namely Plant Breeding and Statistics and Data Processing.

o The Manufacturing and the Agribusiness Departments report to the Director of both departments. The reason for reporting to two Directors is to provide a focus for R&D which caters to the needs of these two main users.

Over the last five years the budget allocation has expanded from RM6.83 million in 1987 to RM14.2 million in 1991. This has been done in response to the needs of the users in three sectors, which are:

o the Plantation Division - to overcome the increasing competitive labour use and the rising production costs in the estate sector by improving productivity and efficiency through minimizing unit cost, reducing losses and increasing net profit without any detrimental effects on the environment in which the three plantation crops are grown;

o the Food Sector - to achieve competitive advantage in the Agribusiness Department by diversifying and intensifying the production of

high food-value and value-added production in the animal -, crop- and food-based R&D; and

o the Non-Food Sector - to overcome over-dependence on the primary commodities where R&D resource-based manufacturing is directed at increasing the domestic and export markets through the widening of the downstream products of rubber and rubber wood, palm and cocoa.

Thus, as can be seen from the set-up of Chemara, the inclusion of new R&D Sections was a direct result of the careful screening of R&D proposals which later led to their establishment. Guthrie Research Chemara, in making these dynamic changes over the years, has demonstrated that in proper R&D screening:

o any R&D thrust should stem from a need to meet the requirements of the users who, in this case, are the two main divisions within the Company itself;

o great emphasis is placed on accountability for funds allocated for the types of R&D required by the two divisions of the Company;

o a very active two-way exchange of research ideas exists, coming from both the top-down and bottom-up directions, leading to a better setting of the research thrust areas; and,

o the prioritization of research areas away from the commodities of the estate sector and towards the agribusiness and manufacturing sectors is made in response to the Company's competition as well as global competition, which are brought about by poor prices of commodities.

THE SCREENING OF R&D

For more effective research, the finer aspects of R&D screening are examined. Past work on this subject has been reviewed by Wood (1976, 1978, 1987), Mohd. Aminuddin (1986, 1988) and Salleh and Tho (1988). These authors have suggested that great care must be exercised when examining the various aspects of the process of R&D screening. The purpose of this screening is to enable research proposals to have a better chance of ending up as innovations that can be commercialized into successful new businesses. It is also to enable researchers to have a say in policy making (Butz, 1989). The aim of carrying out R&D screening is to encourage the Researcher, the Senior Manager, the Departmental Head and the External Consultant to screen the activities in an R&D cycle (Fig. 1) and in the thrust areas (Fig. 2).

Basically these four key players will screen the various R & D proposals depending on whether they are bottom-up or top-down exchanges of research ideas.

The screening factors outlined in Figures 1 and 2 take the following into consideration.

(i) Screening of Projects in the R &D Cycles

On a project basis, the researcher, irrespective of a top-down or bottom-up exchange of ideas, has to identify and define the problem. After an adequate literature review, he/she conceptualizes the research project to resolve the problem. This is to ensure that experiments planned will begin from the current stage of knowledge and will not require repetition of work done much earlier. He/she then sets about writing his/her proposal with the title, a statement of the problem, goals, research justification, scope, methodologies, role of beneficiary, facilities, organization of work, personnel and budget allocation, expected results and other relevant information.

Having given thought to the research proposals and discussed them with his/her colleagues, the Researcher then presents the proposal to the Senior Manager who will review the proposal with respect to the scientific methodology and experimental design, either alone or with the peer group. This peer review is important as the input will result in a better selection and assessment of proposals. After the alterations suggested by the Senior Manager have been made, proposals are then passed to the Departmental Head who, alone or with the Committee, assesses the written plans, time schedules, equipment requirements, facilities, manpower

FIGURE 1 : R&D Screening Process as Applied to Projects in a R&D Cycle

R&D CYCLE	RESEARCHER	SENIOR MANAGER	DEPARTMENTAL HEAD	DIVISIONAL HEAD
o IDENTIFY PROBLEM	/ *	/ *	/ *	*
o PRESCREENING	/ *	/ *		
o PREPARATION OF PROPOSAL	/ *	*		
o FORMAL SCREENING				
- BY INTERNAL COMMITTEE		/ *	/ *	/ *
- BY USER		/ *	/ *	/ *
- BY EXTERNAL COMMITTEE			/ *	/ *
o APPROVAL/MODIFICATION	/	*	*	*
o IMPLEMENTATION	/	/		
o MONITORING	/	/		
- MID TERM REVIEW	/	/ *	/ *	*
o PROJECT COMPLETION	/	/	/	
o POST EVALUATION	/	/ *	*	*
o RESULTS				
- EXTENSION	/	*	*	*
- ADVISORY	/	*	*	
- USER	/	*	*	

KEYS = EXCHANGE OF IDEAS

/ = Bottom up
* = Top down

FIGURE 2 : Key R & D Screening Factors of Thrust Areas

KEY R&D SCREENING FACTORS	RESEARCHER	SENIOR MANAGER	DEPARTMENTAL HEAD	DIVISIONAL HEAD
o NEEDS	/ *	/ *	/ *	/ *
o COMPETITORS	/	/	/ *	*
o FUNDING	/	/	/ *	/ *

KEY R&D SCREENING FACTORS	RESEARCHER	SENIOR MANAGER	DEPARTMENTAL HEAD	DIVISIONAL HEAD
o TECHNOLOGY	/	/ *	/ *	
o PROFESSIONAL SKILL	/	/ *	/ *	*
o GOVERNMENT RELATIONS	/ *	/ *	/ *	/ *
o RELATION WITH OTHER ORGANISATIONS	/ *	/ *	/ *	/ *
o RESULTS/EXTENSION	/	/	/ *	

KEYS = EXCHANGE OF IDEAS

/ = Bottom up
* = Top down

and budget at various stages of implementation of the project.

The approved proposals are then vetted externally by a Consultant who usually comes once a year. The external consultant is usually very objective and relates the research proposals to work done in other institutions or to other prevailing global conditions. He/she also evaluates the appropriateness of the projects to the current major R&D thrusts in the Company or country and identifies what areas have potential for commercialization.

After any necessary modifications, the proposals are approved and sent back to the Researcher for implementation. From then on, constant reviews and adjustments are made to ensure that the projects reach their goals. The Senior Manager may require the Researcher to provide quarterly or half yearly progress reports. Results at mid-course are further reviewed for promising indicators. At the end of the trial, a full report of the results is prepared by the researcher and reviewed by the Senior Manager and the Departmental Head. Promising results are evaluated on a commercial scale with costing. Once shown to be cost effective, the results are released to the users directly or through Extension or Advisory Officers. Field clinics are then organized to explain and demonstrate the new techniques. After a few months in the field, a final evaluation is made to iron out practical problems and the project is then either terminated, or some new aspects arising from the results will be pursued. The final report for publication should include the Researcher's input concerning his/her independent original thinking.

(ii) Screening of R&D Thrusts

In R&D, it is important to emphasize the need to make the correct thrust right from the beginning. Otherwise, at the project level, efforts will be misdirected and ineffective. In order to determine this thrust, a vision of what the Company will be needs to be set out and examined in a scenario format (see Stokke, Boijce, Ralston and Wilson, 1991). Then, based on the needs of the Company, the Divisional and Departmental Heads, in consultation with the Corporate Planner, should decide on what the R&D requirements are. In addition, the Researcher, Senior Manager and Departmental Head should examine what the competitors are doing and how successful they are.

The availability of technological and professional skills of the scientists should be determined by the Departmental Head in consultation with the Senior Manager. Once they have selected the specific individuals, the Departmental Head and Senior Manager should determine whether there is a need to provide

further training, and whether they need to prioritize due to limited funds for the short term retraining of existing Researchers. Also, in order to take advantage of government incentives, they should examine which areas, if any, allow for tax rebates. Other considerations include: Is there scope for joint work with other organizations, institutions and universities ? Can the other organizations' equipment and facilities be used to reduce cost? What is the relationship and networking with other organizations? What is the scope of research that can be done with the existing network and how can it be utilized? For example Guthrie, through the Permodalan Nasional Berhad Collaborative Agricultural Research Committee (PNB - CARC) with Sime Darby and Golden Hope, is currently conducting joint trials. Through RRIM, PORIM, MOPGC, MRPC, MCGC, Guthrie has also established sufficient collaborative research with other organizations. Based on the screening of these factors, a portfolio of priorities in the R&D thrust areas is formulated.

THE BENEFITS OF SCREENING R&D PROJECT AND THRUST AREAS

Having completed the R&D screening as outlined above, it is possible to derive at least five benefits from the process;

o first, it provides explicit recognition of the full range of external and internal forces, the strength of research in the station and the manpower resources and facilities available;

o second, it helps in developing new perspectives, and provides a better understanding of strategy alternatives through improved prioritisation;

o third, it enhances the resilience and the likely success of the strategy ultimately selected;

o fourth, from the enhanced strategic resilience, there will be an increased confidence in making decisions as to which projects and thrust areas are to be adopted; and,

o fifth, it builds team spirit among the Researcher, Senior Manager, Departmental Head and the External Consultant, forging them as a team which is committed to ensuring the success of the R&D programme.

CONCLUSION

Indeed, R&D screening has a significant role in any R&D organization. Generally there is no single methodology for R&D screening which is applicable to all situations, but the above guidelines which have emerged from Chemara's experience will lead to improvements when carried out at various stages in the R&D cycle. It will act as a mechanism for providing justification for investment into research. It will also provide the basis for effective utilization of funds, manpower and facilities which will result in better experimentation and will be likely to produce innovations for effective commercialization. To further assist in annual R&D screening, it is useful to set up a data base to update the annual register of recent and on-going experiments and other related agricultural results. It is also useful to store the register of publications within the Company as well as related topics from outside in order to facilitate an up-to-date R&D screening process.

ACKNOWLEDGEMENTS

The author thanks the Company, Kumpulan Guthrie Berhad, and the Directors of the Plantation, and Manufacturing and Agribusiness Divisions for permission to present this paper.

REFERENCES

Butz, E.L. (1989). Research That Has Value In Policy Making : A Professional Challenge, *American Journal of Agricultural Economic*, 1195 - 1199.

Mohd. Aminuddin, Rouse (1986). *Agricultural Research Evaluation : Guthrie Research Chemara*, paper presented at the report of the consultative meeting on Agricultural Research Evaluation, 26 - 28

January 1988, Genting Highlands, Malaysia, 7.

Mohd. Aminuddin, Rouse (1988). Problem Oriented Research in Industry and Universities, in S.A.K. Abdul Aziz & Glenn E. Schweitzer (Ed.), *Research Management,* 289- 298, Rubber Research Institute Malaysia.

Salleh, M. N. & Pong, T.Y. (1988). Design and Management of Individual Research Projects, in S.A.K. Abdul Aziz & Glen E. Schweitzer (Ed.), *Research Management,* 135 - 144, Rubber Research Institute Malaysia.

Stokke, P.R., Boijce, T.A., Ralston, W.K., & Wilson, I.H. (1991). Visioning And Preparing for The Future, Technological Forecasting and Social Change, **40** : 73 - 86, in Embi b. Yusof. (1992). *Commercialisation of R&D Results,* paper presented at the 12th PAC Meeting, PORIM, 17.

Wood, B.J. (1976). Management of R&D in the Private Sector, in Proceedings, National Agricultural Research Management Seminar, in *Agricultural Research Management,* **2** : 121- 134, Southeast Asian Regional Centre for Graduate Study and Research in Agriculture, Philippines.

Wood, B.J. (1978). *Research in Relation to National Resource Oil Palm,* paper presented at the Seminar on Resources, Research and Education Planter, 1978.

Wood, B.J. (1987). Research Management in the Oil Palm Industry, in *Proceedings from the Workshop on Management of Oil Palm Industry,* 520 - 533, paper presented at the Seminar on Resources, Research and Education Planter, Medan Indonesia 1987.