TECHNOLOGY TRANSFER THROUGH STAFF MOBILITY: III

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This is the last of three articles detailing the movement of executive-level staff out of two large subsidiaries of a multi-national electrical and electronics manufacturer, and attempting to assess their potential for technology transfer into their host companies. A further series of articles will discuss the innovations they made as evidence of actual technology transfer.

The first article dealt with the jobs they had held in the source company and elsewhere, and showed that exits could be divided into three sub-groups, each with considerable potential for transfer [Onyenadum and Tomlin, 1984a]. The second article dealt with the nature of the companies they went to, and showed that, while most were foreign multi-nationals, a substantial number were Irish: some started by the exits themselves (after a considerable delay), others were in the State sector, where the possibility of 'broadcasting' technology existed [Onyenadum and Tomlin, 1984b]. Although these were welcome signs, it was disappointing to see how few exits joined established Irish manufacturing firms. Further light will be cast on this issue in the present article, which deals with the nature of the jobs taken up in host companies, to see how far these jobs, in terms of functional area and hierarchic level, would easily permit the transfer of technology.

Table 1: *Type of Function carried out by Exits*

Function	Last in Source per cent	First After Source per cent	Current per cent
C.E.O.	—	11	25
Technical (a)	72	54	52
Non-Technical (b)	28	35	23

(a) Technical comprises manufacture; ancillary activities such as quality control and plant management; non-industrial technical work such as testing and technical consultancy.
(b) Non-technical comprises accounting and data processing; personnel management; marketing and management consulting.

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IBAR—Journal of Irish Business and Administrative Research, Volume 7, Number 2, Winter, 1985, pp 105-112.

Functional Area in Host Company

As the number of jobs held between the time of leaving the source and the time of the study was very large (participants often changed jobs several times within a single company) it would be impractical to analyse them all. We shall begin our analysis by examining their first job on exit and their current job. Since these are usually very similar — indeed they are often the same in the case of recent exits — we shall concentrate our later analyses on their current jobs only. Clearly a majority left from, went to, and remained in technical jobs. Table 2 shows how little tendency there was to change from one area to another. Most who left from technical positions are now either C.E.O., or doing technical work, most who did not are not.

Before going on to examine their host companies, let us examine the kind of work being carried out, currently and on first move, by the three sub-groups isolated in the first article (Table 3). Since those with technician or lower qualifications, and those who were direct recruit graduates, were most likely to leave from technical positions, it is not surprising to see that they tended both to move to and to stay in technical jobs (we shall refer back to this finding in the section below on hierarchic level attained).

To assess fully their capability for technology transfer, we must relate the jobs taken up by exits to the nature of their host company, in terms of its

Table 2: *Present Function by Last Source Function*

Function	Last Source Function: Technical per cent	Other per cent
C.E.O.	28	17
Technical	67	13
Other	5	70

Table 3: *First and Current Function by Exist Sub-Group*

Sub-Group	First Function: Technical per cent	Other per cent	Current Function: Technical per cent	Other per cent
Technician Level	46	54	52	48
Experienced Graduates	38	62	28	72
Direct Recruit Graduates	71	29	60	40

industrial grouping and ownership (Tables 4 and 5). We have shown absolute numbers rather than percentages in Table 4 to dramatise the fact that no exits are currently engaged on technical work in Irish industrial firms, while many do such work in foreign enterprises. Table 5 begins to shed some light on why this should be so, by showing in greater detail the nature of the industries in which they work. Obviously the vast bulk of exits go into firms manufacturing machinery of one sort or another, mostly electronic, and are currently either running the company or doing technical work in it. This is not surprising, for most exits are engineers whose work experience is in this kind of industry.

But here is where the problem arises. *For there is virtually no established indigenous machinery industry for them to go into.* Irish industry has always been predominantly process-oriented. We never developed a machinery industry of any strength: in 1971 there were only 34 companies with over 100 employees in this sector. As O'Sullivan and Tomlin (1985) show this particular segment of indigenous industry was hit worse than most by the recessions of the last 10 years: it is unlikely that as many as half of these companies still survive. Furthermore, even

Table 4: *Present Function by Type of Host Company (No. of Respondents)*

Function	Type of Company			
			Foreign	Host
	Industrial	Other	Industrial	Other
C.E.O.	7(a)	3	11	—
Technical	—	11	32	—
Other	1	11	7	—
Total	8	25	50	—

(a) Including five who started their own business.

Table 5: *Present Function by Industry Group (No. of Respondents)*

Function	Industry Group					
	Electronic Manufacture		Other Machinery Manufacture		Process Industries	
	No.	%	No.	%	No.	%
C.E.O.	9	26	7	39	2	33
Technical	23	68	8	44	1	17
Other	2	6	3	17	3	50
Total	34	100	18	100	6	100

the survivors have been cutting back on staff rather than expanding. Thus, the employment opportunities in indigenous firms large enough to offer scope to good engineers have simply been non-existent.

It might be asked whether new indigenous firms in this sector could not have absorbed a greater number. The answer is that they probably will — with time. These new firms are predominantly still small and, since their founders largely have a technical background, they no doubt feel they can handle their technical/managerial problems themselves, until the company becomes bigger.

Thus we see that, when a host country has a poorly developed sector, inviting in foreign companies can result in technology transfer in only four ways: (a) by people leaving foreign companies to start their own firms, which a fair number have done in the present case, after considerable delay; (b) by people going to central organisations from which they can 'broadcast' technology to the environment — which a fair number have done; (c) by people later joining new companies such as those in (a) above, as soon as they are big enough to absorb them; (d) by stimulating whatever existing native base exists to make itself attractive to high-quality exits from foreign firms.

Obviously we must anticipate considerable lags before we can expect substantial technology transfer into an area which is poorly developed in the host country: this study suggests that the better part of a generation will pass before it becomes significant. This is not to suggest that we should abandon such a policy — it is crucial in the present world that we develop a significant capability in the engineering industry generally. But we must be realistic and persistent in executing this policy. As a corollary, it now becomes obvious that technology transfer will occur more readily in sectors where the host country already has some capability [Baranson, 1970; Freeman, 1977]. If we are concerned, for instance, about the technical level of our process industries (mostly food and drink) we might consider pursuing foreign investments in these sectors — though no doubt this might be dangerous and opposed by indigenous companies on other grounds.

Hierarchic Level in Host Company

We now examine the hierarchic level attained in host companies, both to see whether exits have the power to innovate (and what innovations to expect) and, as a subsidiary issue, to see who does well and in what kind of firm. Exits attain positions of some importance on leaving — naturally representing a step-up on their exit level — and continue to improve their position as time passes, and as they move. These higher level positions are substantially more likely to have been attained in industry than in services, because many of those in the service sector are in large state-sponsored agencies with deep hierarchies, and where an exit is therefore less likely to go to the top quickly. (Tables 6 and 7).

Given that most of those in industry are in foreign-owned companies, and at senior management level, we might expect from them a preponderance of technico-managerial or system innovations. We should expect purely technical innovations to come from technical staff at a lower hierarchic level. As we shall see in later articles, this expectation is borne out.

Our analysis so far suggests that exits are strongly placed to institute and encourage innovations of a particular kind. (It must not be forgotten that these exits are by no means finished moving onwards and upwards, so their power will continue to increase). We shall close this article by asking briefly whether there are career advantages in coming from a particular background or in going to a particular kind of firm.

Table 8 suggests that a technical background is associated with more varied career possibilities: a greater probability of becoming a C.E.O., but also a smaller probability of becoming a head of function. This in fact does less than justice to technical staff, for they are more likely than non-techni-

Table 6: *Hierarchic Level Attained by Exits*

Hierarchic Level	Last Source Level per cent	First Post-Source Level per cent	Current Level per cent
C.E.O.	—	14	25
Head of Function	6	34	36
Other Management	77	41	33
Supervisory	17	10	5

Table 7: *Hierarchic Level by Type of Host Company*

Hierarchic Level	Industrial No.	Type of Company per cent	Other No.	per cent
C.E.O.	18 (11)	31 (22)	3	13
Head of Function	22 (21)	38 (42)	8	33
Other Management	14 (14)	24 (28)	13	54
Supervisor	4 (4)	7 (8)	—	—
Total	58 (50)	100 (100)	25	100

The figures in parentheses are, respectively, the numbers and percentages at each hierarchic level in *foreign* industrial firms. All non-industrial employment is in Irish firms.

cal staff to have either lower levels of qualifications or less experience (direct recruit graduates). They are also more likely to have left recently and still to be in their first post-exit position. Table 9 shows the difference in level attained by different sub-groups. If these variables associated with a technical background were controlled, its relative advantage would become clearer.[1] Also, it is interesting to observe that many who left from relatively low levels, or with lower levels of qualifications, have nonetheless reached high positions.

We saw in Table 7 that exits tended to do somewhat better in manufacturing firms than in others, partly because they are smaller. It is tempting to ask whether they do better in Irish than in foreign firms. Unfortunately, this question is complicated by the fact that most of those in Irish firms are in larger service companies, whereas most of those in foreign firms are in smaller manufacturing concerns. Furthermore, most of those in Irish manufacturing companies have started their own, and consequently are C.E.O.'s. To make a fair comparison between nationalities of ownership it is therefore necessary to control for all these factors. The result is to

Table 8: *Present Hierarchic Level by Last Source Function*

Hierarchic Level	Last Source Function Technical per cent	 Other per cent
C.E.O.	29	17
Head of Function	29	57
Other Management	37	22
Supervisory	5	4
Total	100	100

Table 9: *Present Hierarchic Level by Exit Sub-group*

Present Hierarchic Level	Technician or Lower No.	%	Sub-Group Graduate Direct Recruit No.	%	Previous Experience No.	%
C.E.O.	5	17	7	28	9	36
Head of Function	8	27	8	32	12	48
Other Management	13	43	10	40	4	16
Supervisory	4	13	—	—	—	—
Total	30	100	25	100	25	100

[1] Among non-technical staff, personnel managers did well. In several cases they had joined at start-up, working under an expatriate chief executive. Having set up the company with him, they were then left in charge when he returned home.

make some of the numbers very small indeed. They are nevertheless reported because of their intrinsic interest.

Table 10 shows that the majority of those going to industry enter somewhat larger foreign companies, but that they do less well in them (so far at least) than those who join smaller foreign firms, and far less well than the tiny number who join small Irish firms. Many of these smaller firms will, one hopes, grow substantially. The moral appears to be that it is better to join a small growing firm — though not necessarily at start-up — than an already established foreign firm. If this remains true, and if it were more widely known among potential exits, it would suggest much scope for small newer Irish companies to attract staff from multi-nationals: but only if they can offer them both technically valuable employment (in the case of younger staff) and hierarchic positions competitive with small incoming foreign firms.

Conclusion

This article has shown that the positions taken up by exits, both in terms of their function and hierarchic level, are very conducive to technology transfer, particularly perhaps of a system or technico-managerial nature. It also points to the fact that our capacity to *receive* technology from these and similar companies is very limited, because of the weak state of the relevant indigenous sector. The only realistic short-term avenues open — starting one's own company or entering a support agency — are in fact being followed. Movement into existing indigenous firms must await the growth of these newly-established companies to the point where they need and can absorb further technical management. This re-emphasises the point in the last article, that industrial policies aimed at developing new capabilities are slow to mature.

Table 10: *Present Hierarchic Level by Ownership and Size of Firm (Industrial Firms only, excluding Owner-Managed Firms)*

	Ownership and Size of Firm							
	Irish Firms				Foreign Firms			
	1-99 Employees		100+ Employees		1-99 Employees		100+ Employees	
Hierarchic Level	No.	%	No.	%	No.	%	No.	%
C.E.O.	2	67	—	—	6	33	4	13
Head of Function	1	33	—	—	7	39	14	45
Other Management	—	—	—	—	4	22	10	32
Supervisory	—	—	—	—	1	6	3	10
Total	3	100	—	—	18	100	31	100

REFERENCES

Baranson, J. 1970, "Technology Transfer through the International Firm," *American Economic Review* 60 (March to May): pp. 435-440.

Freeman, C. 1977, "Economics of Research and Development," in Ina Spiegel-Rösing and Derek de Solla Price eds., Science, *Technology and Society — A Cross Disciplinary Perspective*. London: Sage Publications, pp. 223-275.

Onyenadum, E. and B. Tomlin. 1984a. "Technology Transfer through Staff Mobility: I," *Journal of Irish Business and Administrative Research*. Vol. 6. No. 1. pp. 3-11.

Onyenadum, E. and B. Tomlin. 1984b. "Technology Transfer through Staff Mobility: II," *Journal of Irish Business and Administrative Research*. Vol. 6. No. 2. pp. 15-26.

O'Sullivan, B. and B. Tomlin, 1985, "Innovation in Established Irish Industry," *Journal of Irish Business and Administrative Research*. Vol. 7. No. 1.

BOOK REVIEWS

Book Reviews Editor: M. F. Bradley

Marketing Management – An Introduction by John A. Murray. Dublin. Gill and Macmillan. 1984. £

At a time when marketing is receiving considerable attention, for example in the National Plan, The White Paper, etc. the publication of this book by a local Irish author, is indeed timely. Dr. Murray lectures in marketing in UCD and has experience of teaching marketing to undergraduates, post-graduates and executive groups, as well as practical "field" experience.

The book, which is divided into four parts, is aimed at students of marketing as well as at marketing managers, general managers or chief executives. It is of particular interest to those of the latter groups who wish to formalise what they have learned through experience of marketing and to stay abreast of developments in the discipline. Its perspective objective – which is very useful for those intimately involved in the marketing function – is that of a manager planning the marketing activity of a company, developing a comprehensive new product plan for it, or auditing and reformulating its marketing plans and operations.

Part I deals with the role of marketing in the individual company from two view points. First, it discusses the implications of a marketing perspective for the manner in which a business is managed and for the nature of its development over time. Fundamental to this is the management perception that the purpose and viability of an organisation rests on a basic concern for the needs of customers in the market place. An organisation makes sense, and will survive and prosper, only in so far as it identifies customers needs and mobilises its resources to serve these needs in a profitable manner. Part I also discusses the implementation of the marketing approach through the marketing function within a company, and the fundamental importance of this task to the creation of the strategic underpinnings of any business. The point is made that a marketing approach, implemented through good marketing strategy, is not just a good idea: it pays off. Considerable empirical research testifies to a strong direct relationship between a commitment to marketing and company profitability.

The second part of the book deals with the analysis of customer needs, company resources, and competition that must be undertaken before marketing decisions can be made. These three vital areas must be thoroughly and rigorously analysed so that alternatives for action may be identified and evaluated for relative merit. The author discusses various analytical steps which provide a manager with a logical basis which he can usefully apply to his own situation. Market information (marketing research), what information, the way it is collected and how it is analysed, stored and communicated is also discussed.

With the basic analysis necessary for the foundations of a marketing decision covered in Parts I and II, Part III progresses to describe the structure of marketing decisions, building on prior analysis. Of great importance is the segmentation decision. This has to do with customer groupings, their identification and their importance as generic individual targets (with differing consuming, demographic characteristics, etc) in the build up to the final marketing strategy. When the target customer group is chosen through segmentation analysis, the manager has to "position" the product or service relative to the preferences of the target group and relative to existing and anticipated competitive offerings. To make a positioning decision, the manager must first know (a) customer purchase criteria (eg, price, performance), (b) customer preferences concerning product performance according to each criterion, and (c) customer perceptions of competing products. The manager who has made a decision on positioning strategy now knows the customers with whom he wishes to build a relationship and the position that is most appropriate for his product relative to customer perceptions and preferences. The author then goes on to discuss the "marketing mix". This refers to the four essential elements of a marketing strategy decision necessary to execute the segmentation and competitive positioning strategy. Specifically, this includes the product or service to be produced, at what price, how it will be communicated and sold to the market and how distribution will take place.

Part IV discusses the planning and implementation of marketing decisions. This begins with "strategic marketing" where a company goes through the process of deciding what business it is in, its mission or objectives in being in that business, the functional marketing strategy required to achieve the objectives, and the budget necessary to programme and control implementation. Good strategies and plans have to be implemented through organisational structures and processes. Structures and processes are not just features of larger formalised organisations. They must also be designed into small firms and new ventures. Structures should be developed that fit with and enhance the chosen marketing strategy. They should facilitate company-wide integration of activities to achieve marketing objectives and allocate responsibility and authority clearly while containing the flexibility necessary to ensure continuing marketing adaptation. Alternative structures (ie, functional, product-based, market-based and complex combinations of these) must be evaluated for their relevance to chosen marketing strategies.

This book contains much useful information which will be of benefit to executives with an interest in marketing. The same executives might, however, find it a difficult book to read as it contains a lot of jargon unfamiliar to most. It is a well ordered, logically presented, though cramped book and as the topics covered will often require further analysis by the reader, the inclusion of readings lists at the end of each chapter is to be commended.

Dr Murray has written and presented a timely, pragmatic offering aimed at Irish senior management, students and all of those interested in promoting and developing a genuine marketing "culture" in this country. I sincerely hope that his efforts are rewarded with appropriate success.

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John Murray has written a book that the market has needed for a long time. For those familiar with marketing texts he has written the Irish version of Kotler, albeit much slimmed down. However, lack of size should not imply lowering of standards in regard to coverage of the subject at a basic level. It is basic, but it is excellent as those familiar with Dr. Murray's work might expect. Within the confines of one hundred and seventy-six pages, approximately one-third the size of the standard US marketing text, the author has provided us with a taste of the marketing function in business today. He takes us through the conceptual foundations of marketing – what it's all about, analysis of markets and competitors, the role of research in the firm, marketing decision making and strategy – the building blocks of marketing and finally to questions of strategic and organisational interest.

One aspect that the reader new to marketing may not appreciate is the sharpness of the language, the relevance of the illustrations and the notes of caution which are a feature of the book and which provide a welcome contrast to other texts. An example of this is his paragraph on the misuse of marketing. This is important in Ireland which has only recently discovered marketing at a general public level, and which is being suggested, perhaps too naively, as the answer to our economic problems.

What is the most welcome feature of all is the numerous illustrations and references to Irish companies. Students of marketing in this country have been asking for this for a long time. However, it is not an inward looking book as there are a range of internationally recognisable names there also.

Dr. Murray is operating in very confined space to the delight of the student perhaps. In doing so he can only give us brief glimpses of many topics. He has tried to cover the field and to include mention of most of the significant literature from the international arena. Depth has obviously to be sacrificed in this situation which is a pity because the writer has done an excellent job in producing a very readable and interesting text and one feels that one could take some more of the same in most chapters.

One final comment relates to the presentation of the book. His publisher has, I feel, done the author a grave injustice in regard to the style adopted in the printing. The print is too small and gives the appearance of trying to pack so many words into a given number of pages. In the next edition, for I believe this will be inevitable, I would hope that some lessons will be drawn from the content of the book in regard to making the presentation attractive to the reader. Overall I would recommend this book to anybody who wants a good introduction to the subject that is up to date, of particular relevance to Ireland, and not too time consuming.

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Managing the Training and Development Function by Alan Pepper. London. Gower Press. 1984.

Alan Pepper's first book declares its intentions right at the outset. This is not a book on training methods nor is it about management techniques. Its aim rather is to provide *the* bridge between the general skills and theories of management and their special use in training, an ambitious undertaking, perhaps, but one that is overdue and will be welcomed by a profession which to date has been unduly technique rather than management oriented.

Managing the Training and Development Function means two things to the author. It is firstly about forging close and necessary relationships between training and other organisation parts and functions. Part One of the book, which the author calls THE MANAGEMENT OF TRAINING, deals with this topic and presents training as a collaborative venture shared between the training specialist and line management.

It's secondly about coupling the function with the broader activities of the personnel function. Part Two which is titled THE MANAGEMENT OF MAN-

POWER DEVELOPMENT addresses this issue which is essentially to do with integration. The book is thus concerned in one way or another with how the training function should be positioned vis-a-vis other parts of the organisation.

While the book's focus is novel, much of the content is familiar with topics such as Evaluation of Training, Cost/Benefit Analysis, The Use of Objectives and Career Development all meriting separate chapters. Still there are many things worth being reminded of and few specialists will not benefit from such a clear restatement of basics. The repeated emphasis on Training's *future* orientation is particularly good. Here the author stresses the futility of allowing training functions to operate and be evaluated in terms of volume of activities ("menu-driven" as Americans would say) rather than in terms of future contribution to the organisation. The objectives of Training must derive from the wider objectives of the organisation as a whole, otherwise the function subsists in a vacuum, enjoys precarious tenure and is typically one of the first casualties of a recession. The author is correct to dwell on this issue because sadly Training and Development *is* a peripheral and discretionary commodity in many organisations.

The emphasis on training as a means of maintaining employee adaptability is also very useful. Training is not simply about changing people its also about developing people's ability and readiness to cope with change when it occurs. This is a valuable if somewhat illusive concept.

The overall aim of the book is ambitious and in a number of ways it falls short of what could be expected. It's a "neither nor" sort of book that provides only partial treatment of each subject dealt with. To give an example, the chapter on Cost/Benefit Analysis dwells at length on the measurement of training costs yet provides few original ways of calculating training benefits even though it is measurement of the latter which tends to be problematic.

A more basic disappointment is the overall scope of the book. The author delimits his subject in such a way that Organisation Development is treated as a separate discipline and set of activities – closely related, certainly, but separate all the same. My quarrel with the author on this issue is both semantic and practical. If, as he correctly insists, the objectives of Training and Development derive from broader organisational objectives, distinctions between these two disciplines reduce to terminology only; Training and Development *is* also Organisation Development. Training moreover is often used, quite deliberately, as an intervention in planned organisation change; it's part of the "software" of Organisation Development. Regrettably, its uses in such circumstances are dealt with in only a cursory way and their implications for the management of the function largely overlooked.

Disappointing also is the book's failure to outline how the function can directly influence corporate strategy. While it must be conceded that thinking on this subject is still rather nascent (in the United States it answers to the decidedly grandiose title of Strategic Human Resource Management) at its centre is the powerful proposition that Manpower is an organisational variable which imposes strategic limitations (in the short-term) and offers strategic opportunities (in the longer-term) for the organisation as a whole. Manpower Development can therefore be managed very proactively and with considerably more impact than heretofore. The author eschews such possibilities however. His approach to managing the function is fundamentally more conservative and incremental.

So to a conclusion. Training and Development is an exciting subject but this somehow manages to be quite a dull book. It offers lots of sound and emminently practical advice but manages to be ambitious in intent rather than scope; it has ultimately more to do with efficiency than overall impact and influence. A worth-