

# **The Export Practices and Internationalisation Strategies of Australian Biotechnology Companies**

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## **Abstract**

This research considers the exporting practices and internationalisation of small biotechnology companies. The variables most influential in establishing and sustaining competitive advantage are considered. The study aims to establish a basic understanding of the characteristics of firms within this high technology industry to determine the extent to which companies have adapted an international orientation.

## **Introduction**

The internationalisation of Australian Industry is one of the central challenges facing industry and technology policy in the 1990's. Without doubt, biotechnology is one of the key technologies of the future, with world markets for biotechnology in the year 2000 projected to be in the order of US\$75 billion (Senior Advisory Group for Biotechnology, 1990).

Australia's world class scientific research puts it in a leading position to participate in the exploitation of biotechnology. However, despite a comparative advantage in basic research, it is up to individual firms to create, develop and market innovative products in the international market.

Little has been written specifically on the exporting practices and internationalisation of Australian Biotechnology. In seeking to obtain a better understanding of the factors contributing to export success, this exploratory study seeks to identify those variables which are most influential in establishing and sustaining a competitive advantage in the market place.

This study aims to establish a basic understanding of the characteristics of firms within this high tech industry and determine the extent to which companies in the Australian biotechnology industry have adopted an international orientation.

This study focuses on individual firms and explores international marketing issues at the micro level. As the Australian Manufacturing Council (1989) explains, a nations industrial

competitiveness is determined at three interdependent levels - in the macro level, sectoral level and industrial level.

The internationalisation of Australian industry and particularly the development of specialisation in internationally competitive industries with high export growth is the central challenge of industry and technology policy in the 1990's (Scott Kemmis et al, 1990).

However, Australia is a late entrant into industrial markets. Most comparable OECD countries began the process of internationalisation much earlier when the 'window of opportunity' was wider and competition and the rate of technological change were lower.

In the late 1980's the Australian governments concern about exports was reflected in the number of reports that were released seeking to influence government policy in this area (The Hughes Report, 1989; Garnaut Report, 1989; Pappas Carter Report, 1989; Manufacturing in the 1990's Global Challenge, 1989).

In the past Australia has tended to rely too heavily on high-bulk, low value-added commodity exports rather than high value-added technology based goods and services most capable of contributing to economic development. The revitalisation of the nations manufacturing industry will depend on the ability of firms to produce quality products which are valued on world markets.

It is widely agreed that sustained growth in exports of **elaborately transformed** manufacturers and value-added goods is a critical component in stabilising and eventually reducing the country's external debt.

Greater opportunities to generate price premiums exist in elaborately transformed manufacturers. As a general rule these opportunities increase with the degree of value added and complexity of the goods and services being produced.

## **What is Biotechnology?**

Biotechnology can be defined as "the application of Scientific and engineering principles to the processing of materials by biological agents to provide goods and services" (Australian Biotechnology Association, 1990). Biotechnology includes any technique using living organisms to make or modify products, to improve plants or animals, or to develop micro-organisms for specific use.

Biotechnology is not in itself an industrial sector, rather a set of enabling technologies or tools that have application in a wide range of industries and research fields. Therefore,

biotechnology can be viewed as a generic technology as its scope of application is enormous.

The Australian Biotechnology industry comprises a diverse group of companies:

- Those using traditional technologies to manufacture products such as beer, wine, bread, cheese etc.
- ‘Dedicated biotechnology companies’ - those firms created specifically to exploit the commercial potential of biotechnology. These companies main activity includes research, development, application or manufacture of ‘new’ biotechnologies.
- Large companies whose major focus is not biotechnology, yet is a substantial part of the business, and
- Firms providing specialist services to biotechnology such as legal services, (patent attorneys), technology transfer companies, R&D companies, consultants and equipment manufacturers.

Biotechnology is one of the keys to Australia’s industrial future because it can contribute to the economy in a number of ways;

- It is fundamental to maintaining or increasing the competitive edge in existing export oriented industries such as agriculture, livestock, forestry and mining;
- It is central to establishing new high value-added exports in other industries or niche product areas.

Biotechnology provided industrial activity is expanding rapidly around the world, giving rise to new products and growing world markets. Many of the new biotechnology products are high value-added and low volume, often based upon renewable resources and geared primarily for world markets. It is the commercial opportunities presented by these global markets for novel products which provides one of the main rationale for investing in biotechnology. Biotechnology provides many opportunities to enter high value-added and technology intensive industries which have historically been “closed shops” to Australia.

## **Research Hypothesis and Methodology**

The following five hypothesis constitute the underlying questions that the research aimed to elucidate:

- Hypothesis I Companies with a high export intensity (high percentage of export sales to total sales) are more active in export marketing practices.
- Hypothesis II Small Australian high technology companies are technology driven and not market driven.
- Hypothesis III The main objective for biotechnology companies entering international strategic alliances is market access.
- Hypothesis IV Companies with more experience in exporting (in the latter stages of internationalisation) are more effective at international marketing.
- Hypothesis V Those companies in the human health care/diagnostics and food beverage/brewing segments are more developed for international markets than those in the plan/animal and chemical/environment areas of biotechnology activity.

The research undertaken was of an exploratory nature as little specific research has been conducted on the export practices of Australian Biotechnology firms. The primary data for the project were collected using a cross sectional field study involving the use of a questionnaire administered by mail. A survey by mail was the most feasible means of reaching the sample given time and financial constraints and considering the wide geographic dispersion of the subjects.

The total population of interest for the research constitutes all firms using biotechnologies to develop or manufacture products in Australia. This includes 'Dedicated Biotechnology Companies' whose main activity is the 'new' biotechnology, and larger companies involved in biotechnology, though their core business may not be biotechnology. In all there are approximately 100 such firms in Australia.

Due to the relatively small number of Australian Biotechnology firms it was possible for the entire population to be included in the study. Thus, the population became the sample as it was feasible to include all elements in the survey.

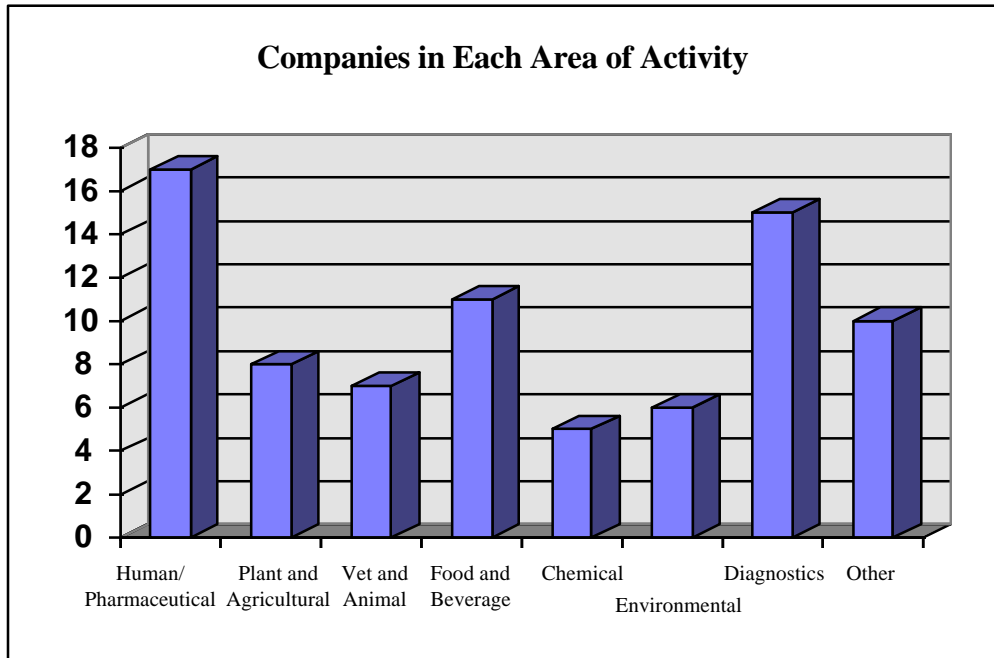
Preliminary phone calls to all target companies enabled personalised questionnaires to be mailed. As a result of these measures, responses were obtained from 79 companies giving an overall response rate of 72%. However, only 64 of these were completed, useable questionnaires, thus the effective response rate was 59%.

Non-useable responses consisted primarily of questionnaires returned by firms which were no longer in biotechnology. Another common non-useable response was that the firm was merely a distributor or importer of products and did not manufacture Australian Biotechnology products.

## **Profile of Respondents**

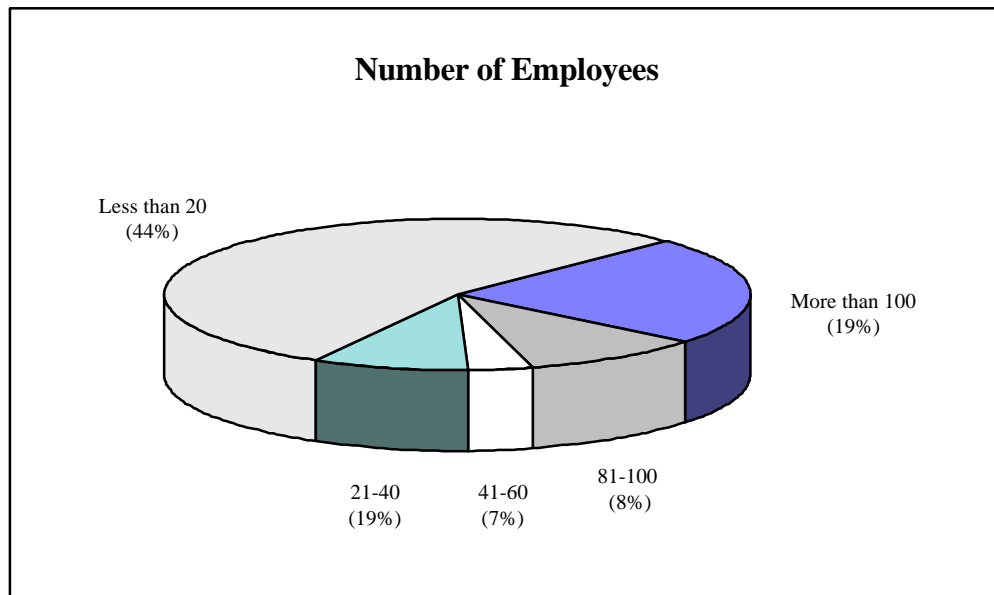
As a generic technology, biotechnology has applications across a number of industries. Figure 1 shows the activities represented by the respondents.

Human Health Care/Pharmaceutical contains the most number of companies, followed by Diagnostics. The relatively large 'other' category includes companies involved in Instrumentation, Medical Devices and Research and Development (R&D).



**Figure 1: Number of Manufacturers by Major Focus of Activity**

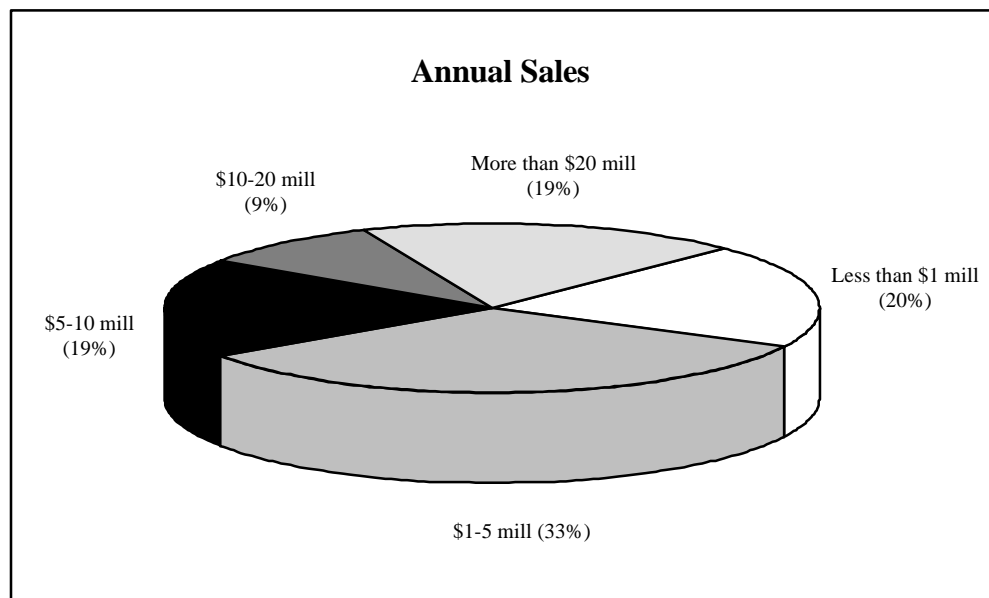
Figure 2 shows the size of the workforce in Biotechnology firms. The industry is dominated by small firms, with 44% of companies employing less than 20 people.



**Figure 2: Size of Workforce in Biotechnology Companies**

The constraints of being small are limited financial and organisational resources and often, lack of marketing expertise. However, advantages of a small company structure are greater flexibility in responding to changes in the market and enhanced creativity and innovativeness.

Similarly, Figure 3 showing the level of annual sales, demonstrates that many of these companies operate on a small scale with over 50 percent of firms generating less than \$5 million in annual sales. The larger firms in these graphs tend to be companies in which 'New biotechnology' is not their core business e.g. South Australian Brewing Company, Arnott's Ltd, or are large Chemical and Pharmaceutical companies e.g. Burns Philip & Company and FH Faulding & Company.

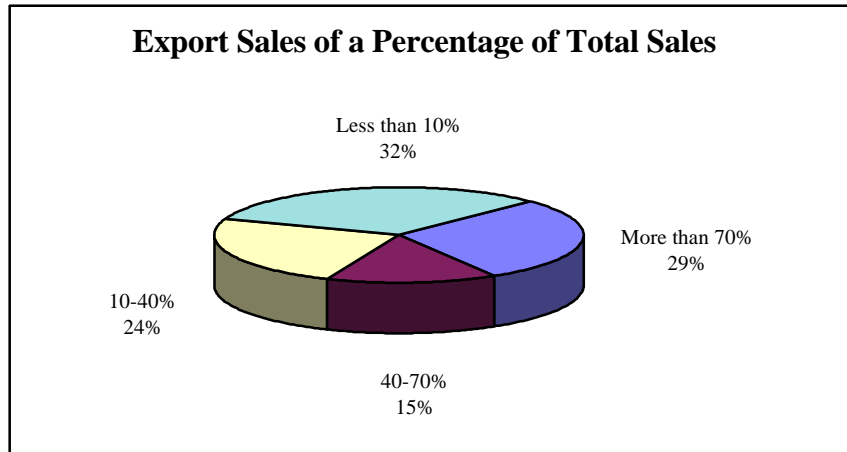


**Figure 3: Annual Sales of Biotechnology Firms**

## **Export Behaviour**

### **Percentage of Sales Attributed to Exports**

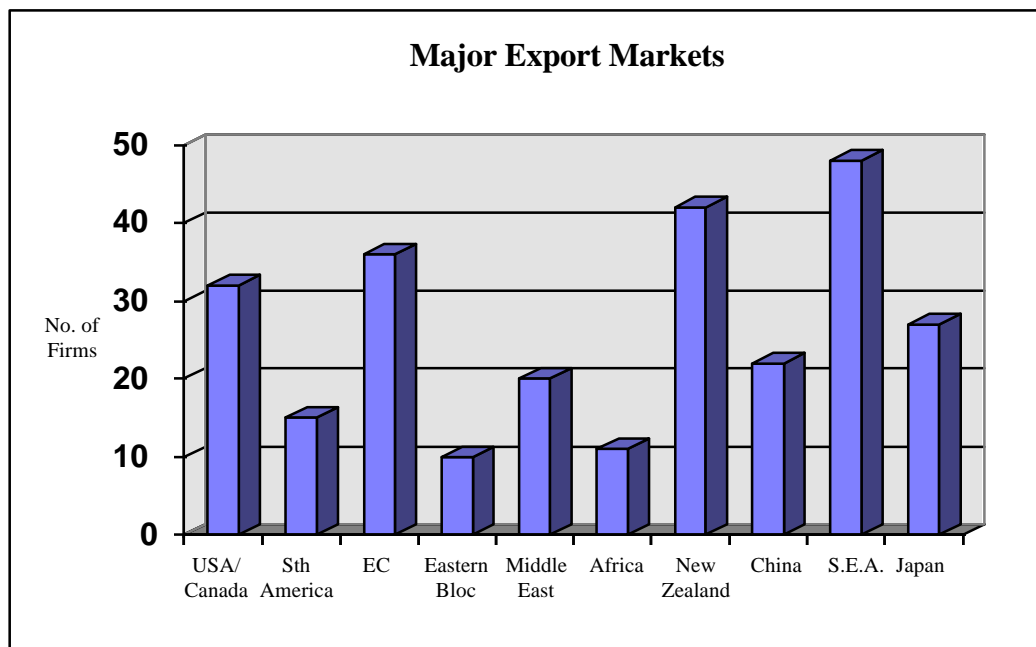
Most companies in the biotechnology industry export a large proportion of their output. In fact about half of the companies surveyed (47%) export more than 50% of total sales. This is a significant finding which demonstrates the high level of dependence Australian biotechnology firms have on international marketing. As these companies have more than half of their sales destined for overseas markets it is critical that they have an orientation towards their foreign customers and market conditions. Figure 4 shows a breakdown of total company sales in terms of export sales.



**Figure 4: Export Sales as a Percentage of Total Sales**

## Export Destinations

Respondents were asked to identify the locations to which they exported their goods and services. The results are shown in Figure 5, with the five major overseas markets in order of importance being South East Asia, New Zealand, Europe, America and Japan.



**Figure 5: Major Export Markets for Australian Biotechnology**

The majority of respondents targeting South East Asia did so because of its geographic proximity to Australia, facilitating ease of distribution and communication. Another attraction cited was the regions rapid economic growth and potential.

New Zealand on the other hand, was targeted because of its close proximity to Australia and its similarity to the Australian market. New Zealand is perceived as being

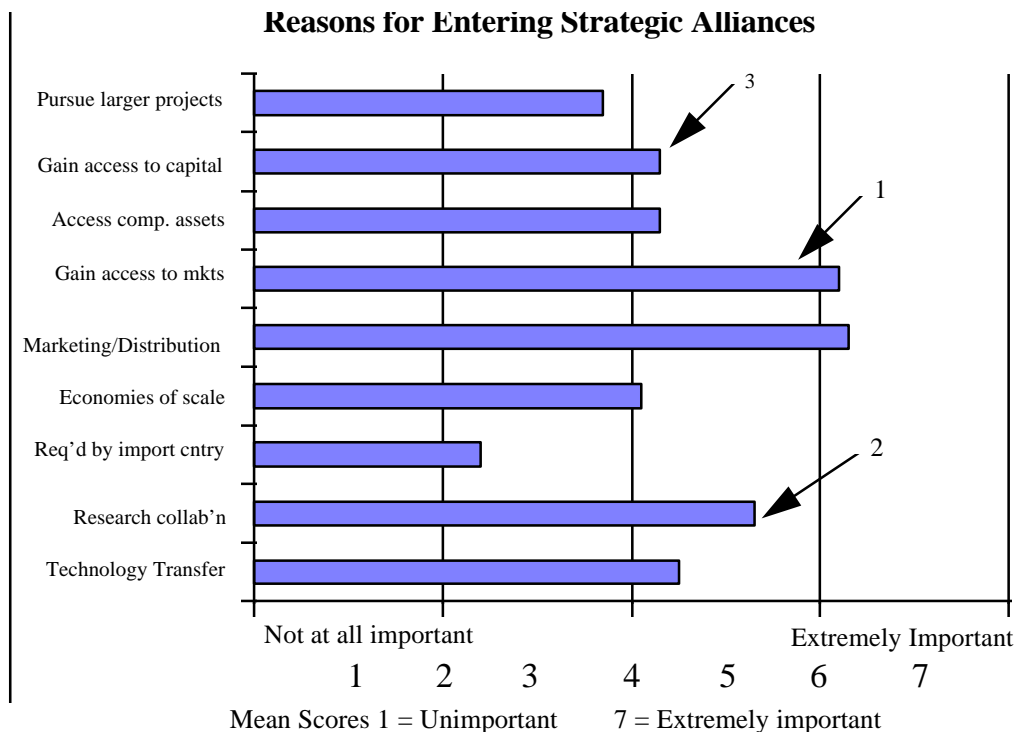
psychologically ‘closer’ to Australia than other markets and is viewed as a good starting point for exporting before attempting to enter the more ‘distant’ markets.

The US and European markets are seen as the largest and most well developed markets, as well as the most lucrative. These ‘wealthy’ markets have a comparable level of health care and technology with Australia, creating a strong demand for Australia’s predominantly ‘wealth-driven’ biotechnology products. However, Australian firms also view these markets as difficult to enter, legally complicated and extremely competitive. Whilst the US and European markets are financially more dependable and have a closer lifestyle to Australian conditions, Australian companies see more of a future in the South East Asia region, China and Japan.

Several companies in the sample did not target any of these markets, rather they were approached by buyers from foreign countries (unsolicited orders) who had a need for their products or technology. These firms seemingly must have extremely marketable products or technology to have been approached by foreign buyers, and it would therefore seem logical that if these companies were to actively market these products or technology overseas they could create more business.

## Export Motives

The research aimed at establishing the reason or motives behind companies export efforts. In a preliminary study a number of options were defined. Respondents were requested to choose from that range of options. The results are shown in Figure 6. As can be seen, companies are exporting predominantly for proactive reasons, that is, they are actively pursuing international markets and not merely reacting or responding to environmental forces.



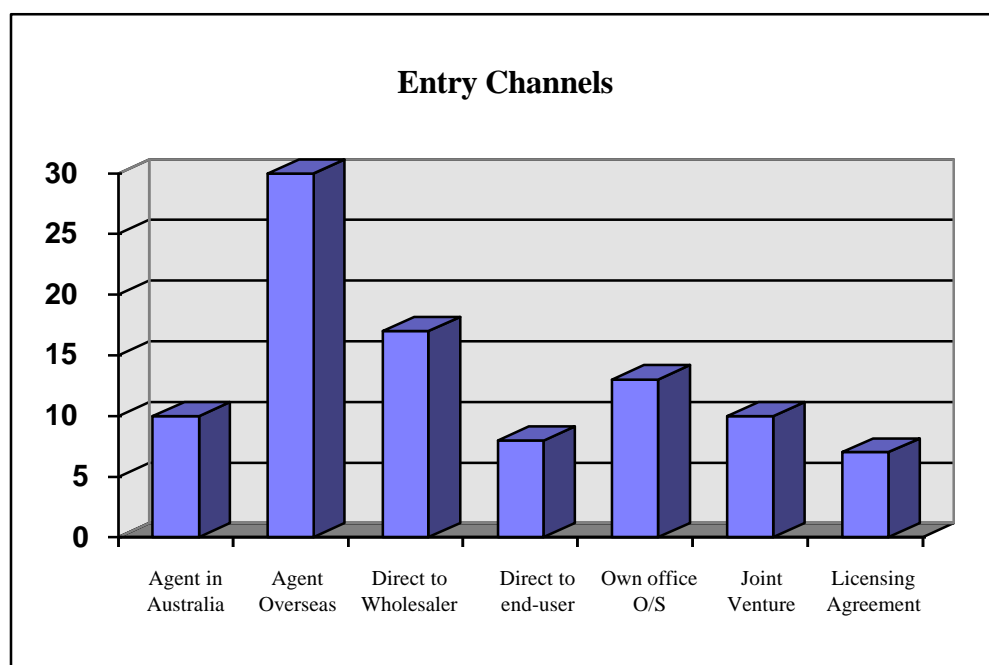
**Figure 6: Motives to Export**

It is comforting to see that the least compelling motive for export was, ‘downturn in the home market’. This is a positive sign as poor economic conditions in the home market, for instance a recession, can often provide the stimulus to export. The danger here is that these ‘recession driven’ sales are a ‘reactive’ motive and are rarely profitable as the firm could lose its international focus once the market strengthens. This would suggest that companies are viewing export activities as a long term investment with the necessary commitment to survive in overseas markets. Therefore as Australia moves away from recession, biotechnology companies will continue to ‘proactively’ pursue an international presence and not revert to focussing on the domestic market.

## Channels of Distribution

The most commonly used mode of entry to overseas markets was by the use of an overseas based agent. This is consistent with the fact that most firms are small and that it is perhaps the cheapest and simplest means to entering overseas markets. Larger, more resourceful companies are able to establish their own office overseas.

Figure 7 illustrates the mode of entry or the channels Australian biotechnology firms are utilising to penetrate international markets. It must be noted that some companies use a combination of entry channels to enter foreign markets.



**Figure 7: Channels/Mode of Entry**

## Marketing Planning and Structure

Of the 64 respondent companies, only 52% had a formal export marketing plan, whilst the remaining 48% have no formal export marketing strategy or plan. Failure by almost half of the companies in the sample to have an export strategy or plan in place suggests that these

firms lack any long term direction in their exporting effort. This is an alarming statistic which poses many problems for these firms and the future viability of their international operations.

Firms were questioned as to whether or not they had a marketing department. Only 59% of firms have a marketing department. This leaves 41% of companies who have no separate functional department that conducts marketing activities. It is likely that these firms rely upon their technical staff to fulfil this function. The companies which do have a marketing department were asked if the manager of that department had a Business/Marketing Degree. Two thirds of these firms had a manager with these qualifications.

Respondents were asked if anybody in the company had attended an export marketing course. Exactly half of the companies had a person who had attended such a course. Given the number of firms exporting and the high percentage of sales flowing to overseas markets, this figure is much too low, suggesting that firms need to acquire the necessary expertise in this complicated field.

## Size of Company and Export Intensity

As Table 1 demonstrates, smaller firms generally have a greater export intensity, that is, they export a higher percentage of total sales. Smaller firms are thus more dependent on exports as a large percentage of their output is destined for international markets. Almost 40% of small companies export more than 70% of their total sales. This high dependence on exports is because most small biotech firms are research-oriented and service distinct niche markets with specialised products. It is of necessity that these firms view the world as their market.

Number of Employees	Exports as a Percentage of Sales (%)			
	Less than 10%	10-40%	40-70%	More than 70%
Less than 20	20	29	13	38
20 - 100	33	19	24	24
More than 100	60	20	0	20

**Table 1: Size of Company (Number of Employees) by Export Intensity**

Whilst, biotechnology firms are exporting large proportions of their output, they do not generally have a marketing orientation. In fact, smaller companies are failing to perform critical export facilitating activities on a regular basis. Only 18 percent of smaller firms undertake marketing research frequently, and only 25 percent undertake export planning and visits to overseas markets 'often or very often', respectively.

The overall results are shown in Table 2. Companies may be failing to perform these activities due to a lack of resources or manpower, however, the pay-off from these activities could well compensate for their expense. Larger firms pay more attention to their overseas markets with 42% undertaking market research often or very often, 45% export planning and 67% visits to overseas markets.

Number of Employees	Export Facilitating Activities % of Firms in each Category		
	Undertake Marketing Research <b>often or very often</b>	Undertake export planning <b>often or very often</b>	Visit overseas markets <b>often or very often</b>
Less than 20	18	25	35
20 - 100	33	29	54
More than 100	42	45	67

**Table 2: Size of Company by Export Facilitating Activities**

## Sub-Industry Comparisons

Companies were divided into four clusters according to their biotechnological activity.

1. Human Health Care, Diagnostics and Other (mainly instrumentation or medical devices)
2. Plant/Agriculture Animal Biotech
3. Chemical and Environment
4. Food & Beverage/Brewing

Dividing companies into these classifications of activity allows comparisons to be made between these sub-industries. Certain factors prevalent in these somewhat dissimilar categories of biotechnology can be identified, enabling a more precise industry analysis.

Most companies in the sample have had relatively limited exporting experience, with the average firm having only seven and a half years in export. Within the industry, however, the Food and Beverage (4) sector and the Human/Diagnostics (1) group contained companies with greater experience in servicing international markets. These clusters (1 and 4) are typically larger, more developed and more wealthy sub-industries and have more developed global markets for their products. On the other hand, the Plant and Animal Biotech (2) and Chemical/Environment (3) sub-industries are less developed and are in the lower stages of the technology cycle. These sectors are generally less experienced in export and are characterised by continued scientific discoveries and rapid innovation.

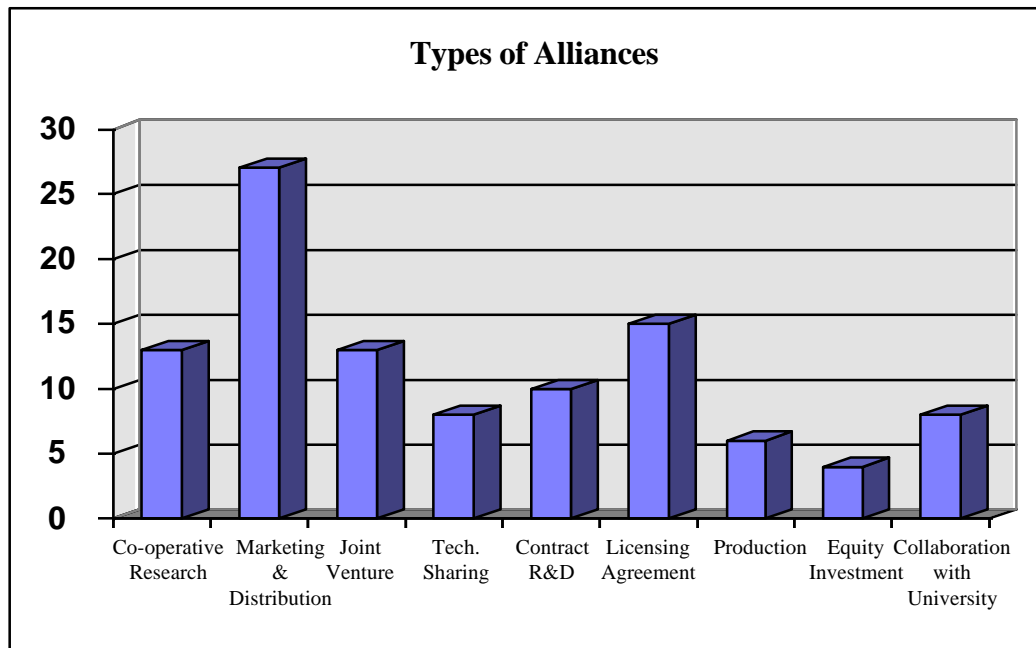
This difference in export experience within the biotechnology industry is shown in Table 3 with 28% of companies within the human/diagnostics segment with export experience of over a decade, and 55% of firms in the food and beverage category with experience of over 10 years. On the other hand, the majority of firms in the plant/animal and chemical/environment biotechnologies have been exporting for less than 5 or 10 years.

Activity	Export Status			
	No Export	1 - 5 Years	5 - 10 Years	More than 10 Years
1. Human/Diagnostics/Other	7%	38%	27%	28%
2. Plant/Animal	7%	47%	33%	13%
3. Chemical/Environmental	21%	36%	21%	22%
4. Food/Beverage	11%	11%	23%	55%

**Table 3: Company Activity by Status of International Operation**

## Strategic Alliances

Of the 64 firms participating in the study, 38 (60%) are involved in some form of strategic alliance. The average number of alliances in which firms are involved is four and 83% of these are conducted on an international scale. The alliances include a spread of varied relationships (see Figure 8). The largest category were marketing and distribution agreements, formed with the primary objective of marketing the Australian firms product(s) in overseas markets. The next most common form of alliances are licensing agreements, joint ventures and cooperative research.



**Figure 8: Types of Alliances**

Strategic alliance activity is evident in all segments of activity within biotechnology. However, the type of alliance activity varies among the segments as illustrated in Table 4. In the Human Health Care and Diagnostics area where product development is closer to commercialisation, there is a relatively higher proportion of marketing and distribution agreements. In the other areas, research focussed alliances are more apparent. Companies in the chemical and environmental segment are least active in strategic alliances.

Activity	Number of Companies with Alliances	
	Has Alliance	No Alliances
Human / Diagnostics / Other	16(62%)	10(38%)
Plant / Animal Biotech	10(67%)	5(33%)
Chemical / Environmental	5(36%)	9(64%)
Food / Beverage	6(67%)	3(33%)

**Table 4: Company Activity with Type of Alliance**

For smaller firms in the sample, strategic alliances have been mechanisms for access to capital, markets and complimentary assets and technologies. The few larger firms have used alliances to gain 'windows or positions' in specific new technology areas. While the large firm

risks losing the capital invested in alliances, the smaller firm risks either losing a major share of the returns due to innovation or losing technological leadership as the technology develops. Losing control of valuable intellectual property is another major concern for small high technology firms.

## **Conclusion**

The Australian biotechnology industry, despite its relative immaturity as an industry has an international orientation, with 88 percent of companies surveyed being involved in export. Although most of these companies are involved in international marketing, they are fairly new to exporting, with the majority (75%) having less than 10 years experience in export.

The large number of firms exporting and the high export intensity across the industry does not necessarily mean that companies are driven by their overseas markets. Previous research has used export intensity (exports as a percentage of sales) as a measure of a companies' export performance. This study has found that the variables of export intensity and export performance to be unrelated. Therefore hypothesis I can be rejected. The study found that whereas larger companies were considerably more attentive to their markets, it was smaller firms that showed a lack of attention to basic exporting procedures. For example, only 18 percent of small companies undertook market research regularly. Only 25 percent of companies undertook marketing planning. These findings conclude that small research based biotechnology companies appear to lack a marketing orientation this confirming hypothesis II, i.e. are technology driven rather than market driven.

The main benefit of strategic alliances as perceived by the respondents was market access. These findings confirm hypothesis III.

Companies with more than 10 years experience in international marketing showed a considerably higher propensity to conduct export related tasks such as export facilitating activities and procedures than companies without this experience. The results confirm the fourth hypothesis - companies with more experience in exporting are more effective in international marketing.

The Human Health Care and Diagnostics and Food and Beverage sectors were shown to be more aware of the needs of the market than the other sectors. The survey results confirm hypothesis V.

The results point to key market related areas where companies in the field of biotechnology may consider in greater detail in view to further improve their international competitiveness.

The exploratory study highlights a number of areas requiring further in-depth research.

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