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Enterprise Factors Contributing to The Success of Malaysian Biotechnology SMEs: A Grounded Theory Approach

Saridan Abu Bakar, Mohamed Sulaiman and Intan Osman

While numerous empirical studies have been conducted in Western countries on biotechnology enterprises, little empirical research has been done in Malaysia especially in respect to the factors that contribute to the success of biotechnology small and medium enterprises (SMEs). In view of this, a study was undertaken recently in Malaysia to address this gap in the existing body of biotechnology knowledge. Using a grounded theory approach, this qualitative study managed to develop a conceptual framework that sheds useful information on the enterprise factors that significantly impact the success of Malaysian biotechnology SMEs. Specifically, this study found that organizational structure, innovation activities, linkages with academic research institutions, linkages with other private enterprises, personal linkages with academic researchers, access to financial capital, the procuring of government assistances, vertical integration, enterprise image, GMP compliance and halal certification, strongly influence enterprise success.

Keywords: *biotechnology, SMEs, Malaysia, success, qualitative study, grounded theory*

Introduction

Biotechnology may be defined in terms of the use of biological organisms for the attainment of commercial ends (Fransman, 1991). Biotechnology business refers to enterprises that use biological organisms, through various biotechnological techniques, to develop products for human and animal healthcare, agricultural

productivity, food processing, renewable resources, industrial and environmental management (BIOTEK, 2001; National Pharmaceutical Control Bureau, 2005; Shahi, 2004). The Malaysian Government has identified biotechnology as the next engine of growth for the country. It has been touted as one of the five core technologies that will accelerate Malaysia's transformation into a

highly industrialized nation by 2020 (Malaysia, 2001). Accordingly, Malaysia has wisely invested in biotechnology to achieve a rapid advancement in agriculture, human health and other relevant industrial sectors (BIOTEK, 2001).

The Malaysian biotechnology sector is dominated by small and medium enterprises (SMEs) (Biotechnology Information Centre, 2001). Currently, biotech SMEs are not clustered in any specific geographical location. Most of the companies are concentrated in Kuala Lumpur and Selangor, while others are scattered across the country in places like Penang, Melaka, Johor Bahru as well as East Malaysia, in Sabah and Sarawak.

The importance of SMEs in the development of the biotechnology sector in Malaysia suggests that an understanding of the success factors of these SMEs is crucial to the stability and health of the technology, and eventually the nation's economy. Despite their importance to the country's economy and the heightened attention accorded to them of late, and notwithstanding the hefty allocation of the nation's budget for biotechnology advancement, little empirical research has been done on biotechnology SMEs in Malaysia. In addition, no substantial research has been conducted to explore enterprise factors that contribute to the success of these enterprises. This research therefore, is an attempt at answering the question of what enterprise factors contribute to the success of biotechnology SMEs in Malaysia. By specifically focusing itself on the identification of these contributing factors as its main objective, this study fills a gap in the existing

literature, especially in Malaysia, on to this subject.

Methodology

This research utilizes a qualitative method to data collection, analysis and interpretation on relatively unexplored topics. The qualitative study serves to explore the enterprise factors that contribute to the success of Malaysian biotechnology SMEs and why some factors are more important than others.

Grounded Theory

Morse and Richards (2002) identified three major qualitative methods namely *grounded theory*, phenomenology and ethnography. *Grounded theory* methodology is being used to seek answers to the research questions in this qualitative study rather than ethnography or phenomenology. The reason for choosing *grounded theory* method for this qualitative study is based on the nature of the research problem. Merriam and Simpson (2000) referred to *grounded theory* method as particularly suited to examine a phenomenon about which little is known. Strauss & Corbin (1994) claimed that the *grounded theory* method can generate novel and exciting ideas about things that have already been heavily investigated. Based on the stated merits of *grounded theory*, the authors of this study hope that it will provide new insights into the factors that contribute to the success of biotechnology SMEs in Malaysia. *Grounded theory* may also have a greater potential for its applicability

to practice because it fits and works in a sustentative area as a result of its being grounded in data collected within a specific area (Glaser and Strauss, 1967).

Grounded theory methodology provides a way to conceptualize data. It begins with the researcher's vision and ideas of possible routes of inquiry and the techniques and procedures merely provide the means to do this. However, it is important that preconceived concepts do not prevent receptiveness or sensitivity to new ideas that may emerge from the data. Descriptions are basic to theorizing and therefore need to be analyzed with a contextual awareness of the purpose of the study and its audience.

Grounded theory methodology also provides an opportunity to explore unanticipated concepts that emerge, requiring the researcher to be flexible and sensitive to new or unexpected alternative issues. It provides useful tools to organize and manage the data. The emergent theory is constructed through interaction of the data. Strauss, one of the original authors of *grounded theory* believed that *grounded theory* provides the structure for analytical interpretation of multiple actors' perspectives through interaction with the data and that the method can be adapted to suit many ends (Strauss and Corbin, 1998).

Data Collection

Data for this qualitative study were collected in the form of transcripts of nine in-depth interviews with biotechnology entrepreneurs and supplemented by field notes. These materials

represent the respondent opinions, ideas and perceptions of the entrepreneur factors that contribute to the success of biotechnology SMEs. Interviews are commonly used in sociology and anthropology; their aim being to collect information and thus discover the interviewees' opinions and values, framed in their own meaning (Fontana & Frey, 1994). Each interview was semistructured and guided by a set of open-ended questions that focus on entrepreneur, enterprise and external environmental factors that contribute to the success of SMEs. An initial draft of interview questions based on the research questions was developed with flexible outlines for the open-ended questions and topics for discussions to follow-up on concepts as they evolved.

The study chose in-depth interviews for data collection in order to gain information such as thoughts, intentions and feelings that otherwise might not be directly observable (Merriam, 1998). Most data were collected in an informal setting in the office of the respondent, who were interviewed alone by the researcher. The interviews explored the entrepreneurs' perceptions of their enterprise successes. Each interview normally began with an introduction and an explanation of the purpose of the research. This was then followed by a clarification of the criteria used and the reasons for choosing selected respondent. In addition, an explanation on how the data will be used was also made. Permissions were sought from the respondent for the audio recordings made in the course of the interviews. The interview questions were, by design, open-ended in order to

encourage the respondent to share their experiences and insights which can be linked to about factors that contribute to the success of their biotechnology enterprises.

The respondent were first asked to describe their enterprises in general. Having scoped a general understanding of the businesses, these researchers then proceeded to ask the respondent to identify and elaborate on factors that they believed contributed to the success of their enterprises. Subsequently, the respondent were asked to project any future plans or directions that they have for their enterprises, as well as to evaluate their own personal traits that have a bearing on business success. To encapsulate the relative meaning of success, the respondent were asked to define their measurements of enterprise success.

Sampling

Random samples are of little use in a qualitative research. Consequently, these researchers opted for purposeful, or theoretical sampling, in order to seek out informants that could provide the richest and most detailed data on the subject in question (Patton, 2002; Seidman, 1991). As the focus was on collecting detailed, in depth information, the number of Respondents was small. The main criterion used for judging sample size is saturation of information. When these researchers began to hear the same theme being reported over and over again and no longer learned anything new from the participants, they were confident that a category was saturated (Glaser and Strauss, 1967), and thus data collection was complete.

Respondent Selection and Process

The sampled owner-managers of biotechnology SMEs were approached directly and invited by these researchers to participate in in-depth face-to-face interviews. They were drawn primarily from the biotechnology enterprises listed by the National Pharmaceutical Control Bureau (NPCB), Ministry of Health Malaysia (MOH). In total, nine semi-structured in-depth interviews were successfully conducted. All interviews were conducted in an informal setting in the offices of the Respondents and lasted in one to two hours, with the majority lasting in about two hours. All Respondents were given an introductory letter and briefed a second time on the nature and purpose of the study at the beginning of the interviews. Code names were established for each respondent as shown in Table 1.

Validity and Trustworthiness of the Study

Creswell and Miller (2000) defined validity as how accurately the account represents the realities of the social phenomena to the respondent and how credible is it to them. There is a general consensus that qualitative researchers need to demonstrate that their studies are credible. Several authors identified common procedures for establishing validity in qualitative research (e.g., Lincoln and Guba, 1985; Maxwell, 1996; Merriam, 1998). Qualitative researchers normally employ and report member checking, triangulation, thick description, peer

Table 1. Code Names for respondent

Code Name	Enterprise	Position	Sex	Age	Education	Product	Start-up Year	Full Time Employees
Respondt 1	Company Number 1	Managing Director	M	36	Secondary	Traditional	1994	40
Respondt 2	Company Number 2	Managing Director	M	46	Diploma	Traditional	1992	40
Respondt 3	Company Number 3	Executive Chairman	M	51	Diploma	Traditional	1994	75
Respondt 4	Company Number 4	Manager	M	48	Diploma	Traditional	1990	16
Respondt 5	Company Number 5 and 6	General Manager	M	58	Secondary	Traditional	1996	60
Respondt 6	Company Number 7	Manager	M	57	Secondary	Traditional	1951	40
Respondt 7	Company Number 8	Executive Director	M	62	Primary	Traditional	1972	70
Respondt 8	Company Number 9	Managing Director	F	48	PhD	Cosmetic	1997	15
Respondt 9	Company number 10	Chairman	F	64	PhD	Cosmetic	1994	130

reviews and external audits in their studies (Creswell and Miller, 2000).

In this study, several procedures were utilized to ensure that the information provided by **respondent** was true and accurate and that the analysis of data was systematic, intensive and valid. Member checking and triangulation were used to validate interview transcriptions. In addition, **thick description** was adopted to ensure that every theme that emerged during the study convey similar meaning to both respondents and the researcher.

Firsthand reporting as suggested by Miles and Huberman (1994) was the forth validation strategy used. Notes taken during the interviews were yet another strategy employed to ensure that information gathered from the **respondent** was true and accurate. Peer review was

the sixth strategy used. Next, participatory methods of research, as suggested by Merriam (1998) were used in both the semi-structured interviews and the informal interactions between the participants and the researcher. Finally, identification of the researcher's biases may also add validity to qualitative research (Merriam, 1998).

Result of Cross Case Analysis

Drawing from the in-depth interviews with nine biotechnology entrepreneurs, representing 10 biotechnology SMEs, 35 themes related to the enterprise factors and success emerged. These themes from the interview transcripts are shown in Table 2.

All the 35 themes are segregated into four main sections as follows:

- Enterprise success
- Property-based resources
- Enterprise strategies
- Organizational structure

Table 2. Themes from the Interview Transcripts

1	Enterprise success	9	39	9.97	9.97
2	GMP Compliance	9	30	7.67	17.65
3	Property-based Resources	9	27	6.91	24.55
4	Innovation activities	8	25	6.39	30.95
5	R&D	8	25	6.39	37.34
6	Government assistances	8	23	5.88	43.22
7	Access to capital	8	17	4.35	47.57
8	Enterprise growth	8	16	4.09	51.66
9	Linkages	8	14	3.58	55.24
10	Product quality	8	14	3.58	58.82
11	Other enterprise strategy	5	14	3.58	62.40
12	Vertical Integration	5	14	3.58	65.98
13	Satisfaction	8	12	3.07	69.05
14	Linkages with other SMEs	7	10	2.56	71.61
15	Linkages with universities or research institutions	7	10	2.56	74.17
16	Enterprise image	7	10	2.56	76.73
17	Product diversity	4	9	2.30	79.03
18	Product newness	7	9	2.30	81.33
19	Financial profitability	7	8	2.05	83.38
20	Well known	6	8	2.05	85.42
21	Sole proprietorship	5	7	1.79	87.21
22	Halal certification	3	6	1.53	88.75
23	Product uniqueness	5	6	1.53	90.28
24	Safe for consumption	5	6	1.53	91.82
25	Trusted	5	5	1.28	93.09
26	Contract manufacturer	4	4	1.02	94.12
27	Growth in sales	4	4	1.02	95.14
28	Original products	4	4	1.02	96.16
29	Continuous product improvement	2	3	0.77	96.93
30	Organic structure	2	3	0.77	97.70
31	Organizational structure	3	3	0.77	98.47
32	Growth in product lines	2	2	0.51	98.98
33	Personal linkages with researcher of the universities or research institutions	1	2	0.51	99.49
34	Committed employees	1	1	0.26	99.74
35	New markets	1	1	0.26	100.00
	Total		391	100.00	

Entreprise Success

Since the fundamental research question deals with the factors that contribute to the success of Malaysian biotechnology businesses, it is only to be expected that a lot of discussions during the in-depth interviews would revolve around the definition of success. Reacting to open ended questions on this matter, the respondent gave many and diverse answers as to what constituted success from their respective viewpoints. In addition, various measures of success were also quoted. Respondt 4 (1 July 2005), for example, believed that enterprise success should be able to be measured and valued physically. According to him, "Business success must be visible and measured in physical terms."

Respondt 8 on the other hand, stressed both the physical and spiritual measures of success. According to Respondt 8, "My view is that, success should be measured in terms of both the physical and the spiritual. From a physical sense, we can be regarded as successful if the business can stand on its own without relying on any external help." (Respondt 8, 18 July 2005).

Respondt 1 specifically identified personal satisfaction, financial profitability and growth as appropriate measures of his enterprise's success. In this case, Respondt 1 stated that:

To me, satisfaction is number one. You must enjoy what you are doing. Then, you will be more committed and able to manage the business successfully. However, a business needs money in order to be more successful and be able to grow and contribute more to the owners. In my opinion,

profit and growth are also important to measure how successful you are (Respondt 1, 15 June 2005).

Financial Profitability

Financial profitability was the most commonly used measure of success for biotechnology enterprises in this study. Seven out nine Respondents stated that financial profitability was the way they measured enterprise success. In many cases, the respondents pointed out that profitability will contribute to the wealth of the enterprises' shareholders as well as fund future growth. Respondents 1 said, "Business need money to be more successful. Therefore, it will be able to grow and contribute more to the owners. In my opinion, profit and growth are also important to measure how successful you are." (Respondt 1, 15 June 2005).

Financial profitability will also enable the enterprise to serve its obligations to the outside parties and realize the purpose of its own existence. The gist of these contentions was voiced by Respondts 4, 3 and 5. According to Respondt 5, "All businesses that we are involved in must be beneficial to the owners and shareholders of the companies. Otherwise, we will incur losses *lah!*" (Respondt 5, 4 July 2005).

Equating success with profitability, Respondt 6 proceeded to explain the profitability measurement. According to this Respondent, "To me, success in business means that we make profits. If a business is capable of making profits as compared to the cost outlay, we can regard it as successful" (Respondt 6, 8 July 2005). Respondt 8 (18 July 2005)

emphasized that her enterprise needs to make profits in order to fulfill her social obligations. According to her, “When the company makes profit, and with that profit, I can help others, like the society around us.”

Enterprise Growth

Among the various criteria mentioned by the Respondents to measure biotechnology enterprise success, growth was by far the most commonly agreed as an appropriate measure. However, it is the contention of these researchers that the success of many of the respondents could be more attributed to the long period of time that they had been in the business. As such, when we talk of growth, we need to factor in the element of time as well in order for us to have a balanced view of the importance of growth as a measure of success. According to Respondt 1, “In my opinion, profit and growth are also important to measure how successful you are.” (15 June 2005).

With regards to enterprise growth, Respondents have in turn associated it with various factors. Firstly, as claimed by Respondt 4, the legal form of an enterprise has a bearing on growth. According to this Respondt, an enterprises that is registered as a Private Limited Company, stands a better chance of growing as compared to other types of legal forms. Respondt 4 said: When we first established the business then, we were registered as an enterprise, that is, a sole proprietorship. However, later on we changed it to a private limited company. To me, this registration as a private limited company enables us to expand much more easily as compared to

a business that is registered as an enterprise.

In addition, Respondt 4 also discussed financial profitability as a means to finance future business growth. Respondt 4 (1 July 2005) explained that, “For [name of the enterprise is withdrawn], our primary business goal is to make profits; and it is from these profits that we can settle all our loans and consequently further expand our business. Respondt 6 (8 July 2005), on the other hand, attributed growth to his vast experience. According to Respondt 6: I have been involved in this field since the early years of the 70’s. My experience in the management and the running of the company’s operations has helped me to some extent to initiate and expand the company to what it is today.

Respondt 7 associated enterprise growth with vertical integration strategy and, similar to Respondt 9, also related growth with his social obligation to the community. According to Respondt 7, “To me, that’s another way of expanding. I find that expansion in a related field is profitable.” He further added by stating that, “To me, we should not just be expanding. We should also be able to provide contributions to our society. To me, a business that is capable of expanding will be able to contribute more to the society.” In addition to the above, Respondt 7 (12 July 2005) emphasized continuous learning and proper planning as being important for the sustenance of enterprise growth. According to this Respondent, “I feel that the universities, like the one you are working for, should offer courses on planning to those who wish to expand their enterprises.” **The justification**

for proper planning was given thus, “This is [true] because, if we do not carefully think through our plans, the company can only sustain itself but would not expand.”

One other Respondent that commented on enterprise growth was Respondt 9. According to her, the action taken to revamp her management team was an impetus to the subsequent growth that happened to her enterprise:

“In the 80’s, our company expanded so fast. Later, the growth became stagnant and began to decline. That time I got to ‘overhaul’ the whole membership of our management team. I placed in new and young members. Then we started to pick up again”. (Respondt 9, 24 July 2005). This Respondent also gave examples of how the revamp strategy worked for her, besides other factors such as enterprise age, new markets, proper planning and adequate financial resources. She said:” [Name of the enterprise is withdrawn] exists since 1977. From that time you can see that we are growing from one center to many centers, around the country, and also in many other countries. I think age of the company is also an important factor because it takes time to grow from one stage to the other. You need time to grow. You cannot be successful overnight, right? “

She further added that, “I think among other good reasons why we managed to penetrate these new markets are opportunities, good planning and enough financial resources. These factors are very important for expansion.” (Respondt 9, 24 July 2005). Enterprise growth can be further classified into growth in sales and discussed below.

Growth in Sales

Respondts in this study identified growth in sales as the measure of enterprise success. This is what Respondt 3 (29 June 2005) had to say, “An increment in sales revenue and business assets. According to Respondts 4 and 5, their growth in sales was due to new market penetration. Respondt 5 also added that the GMP factor was also responsible for increasing the sales of his business. In this regard, he mentioned the ability of GMP compliant factories to manufacture products of other non-GMP companies as a contributor to revenue. His views on contract manufacturing were similarly shared by Respondt 6 (8 July 2005). In this case, Respondt 6 stated that, “With a GMP certified factory, we can also produce goods of other companies that do not possess GMP.

Satisfaction

In the above discussion on the criteria used by respondents to measure success, a heavy emphasis has been given on those that are objective and measurable in keeping with what the majority of the respondents felt as appropriate measures. However, in order to do justice to the qualitative analysis, these researchers also need to look at a non quantitative measure that has been identified by some respondents at least as equally if not more important. This non-quantitative measure is satisfaction.

Four respondents (1, 2, 4 and 7) placed satisfaction highly in their hierarchy of success measures. According to Respondt 1 (15 June 2005), “There are many ways to measure success. For me, satisfac-

tion is number one. You must enjoy with the one you are doing. Therefore, you will be more committed and able to manage the business successfully.”

With this regard, Respondt 2 added that, “To me, success relates more to one’s satisfaction after having achieved what one sets out to do. We need to be happy with what we do. Only then do we gain satisfaction!” (Respondt 2, 21 June 2005). While Respondt 6 concluded that, “Nevertheless, to me, internal non-tangible success is of equal importance. What I mean by this is that we need to feel satisfied and to enjoy what has been accomplished.” (Respondt 6, 8 July 2005).

Respondts 7 and 8 equated satisfaction with the ability to contribute to society. This is what Respondt 7 (12 July 2005). had to say, “We are successful because we can work on something that we like to do. [&] in addition, that something in turn is providing returns and capable of making contributions to society. To me that’s what I call true success.” With this regard, Respondt 8 commented that: “This is the most important aspect that is seldom given due attention. Spiritual here refers to the satisfaction derived from our achievement. I am very happy and satisfied when the company makes profit, and with that profit, I can help others, like the society around us.” (Respondt 8, 18 July 2005).

Respondt 8 (18 July 2005) further added, “At this juncture, I am grateful to Allah because the business that we are in is not only one that I enjoy doing but also one that allows me to contribute to others.” Respondt 5, on the other hand, stressed customer satisfaction as a cause for

personal satisfaction. According to the Respondent, happy customers will be loyal users of an enterprise’s products over an indefinite period of time. She claimed that, “Consumers who are satisfied with our products will continue to be loyal users of these products. If consumers are happy, then I am also happy. That is what I call true success.” (Respondt 5, 4 July 2005).

In a nutshell, the Malaysian biotechnology entrepreneurs have varying interpretations of what constitutes business success. Predominantly, the Respondents in this qualitative study favoured the objective and measurable criteria as the appropriate measures of their success. These include financial profitability and growth. However, esoteric consideration was also mentioned as equally if not more important by a few respondents. To these respondents, personal satisfaction ranked highly in their hierarchy of valid measures of business success. On the whole, growth was mentioned 16 times, while satisfaction, 12; and financial profitability, 8.

Property Based Resources

Enterprise Image

All Respondents pointed that enterprise image was a factor that contributed to the success of their enterprises. For instance, Respondt 7 stated that, “I also believe that the enterprise image of the enterprise is also one of the primary success factors of [name of the enterprise is withdrawn].” (Respondt 7, 12 July 2005).

Respondt 6 further added that, among the pioneer in the industry, his enterprise is well known to the consumers in this country than the rest. According to Respondt 6 (8 July 2005), “We are among the first *Bumiputera* company to manufacture and market traditional products in this country. Our brand is widely known, not only in the northern states [of Peninsular Malaysia] but also in other parts [of Malaysia]. “

In addition, four other respondents also agreed with him. They are Respondts 1, 9, 3 and 7. These respondents also associated image with the age of their enterprises. Respondt 9 (24 July 2005) stated:

“Another thing is the image factor. Enterprise image also doesn’t come overnight! You need time to develop your name, reputation and trust. [Name of the enterprise is withdrawn] has been well known in Malaysia for a long time. Maybe your mother or your aunties have, at one time or other, used the products of [name of the enterprise is withdrawn]. As such, the enterprise image that resides in [name of the enterprise is withdrawn] is one of the success factors of the business.”

In addition, three respondents further associated enterprise image with the quality of products they produced. They are Respondts 1, 4 and 8. According to Respondt 4, “For me quality is the main thing. Otherwise how could [name of the enterprise is withdrawn] managed to stand until today. Just mentioned [name of the enterprise is withdrawn], people will know that they will get the quality product.” (Respondt 4, 1 July 2005). In this juncture, Respondt 7 believed that enterprise image enabled the enter-

prise to compete. According to him, “**Competition in this industry is high** but we are able to cope with it. One of the ways to enable this is through enterprise image.”

Enterprise image also been associated with products they produced. In this case, Respondt 2 (21 June 2005) stated that: “Another thing, [name of the enterprise is withdrawn] also become a brand for haruan products. As we already know, *haruan* is very effective to cure internal bleeding, such as after operations and for women who just delivered their babies. Thus, [name of the product is withdrawn] [that we produced] has also been associated with the way to treat those internal bleeding.

This respondent further added, “Yes. Not only [name of the product is withdrawn], but also name of the manufacturer.” In addition, through good image, the enterprises also able to get additional income through contract manufacturing activities. According to Respondt 5:

“We have been long [in this business]. Our products are already known by the market. Other enterprises also believed in our capabilities. So, we also produced products for other enterprises. Sometimes you will find two or three [brands of the products] in the market. But we are the one who manufactured them (Respondt 5, 4 July 2005).

Based on the above mentioned statements, enterprise image is another variable that contribute to the success of biotechnology enterprises in Malaysia.

GMP Compliance

Good Manufacturing Practices (GMP) compliance emerged as a much discussed theme during the

in-depth interviews. Mentioned by all respondents with a total number of 32 times, GMP compliance was associated by all the respondents with the manufacture of safe products for human consumption. Today's consumers are much more particular and wary when it comes to the purchase of pharmaceutical, traditional and cosmetic products. One of the criteria used by them for ascertaining the quality and safety of such products is the GMP accreditation of the factories involved in the production. According to Respondt 1 (15 June 2005), "Consumers nowadays are more advanced and more educated than before. They will only consume products that are produced by GMP certified factories and safe."

Entrepreneurs who are in compliance with GMP have better opportunities in the local and foreign markets for the sale of their biotechnology products. According to Respondt 3, This enforcement of the GMP also means that our products are able to enter the markets of foreign countries where there are even more stringent controls on herbal or natural based products. Our GMP is truly in a class of its own! (Respondt 3, 29 June 2005).

While Respondt 7 argued that, "[Even] though the GMP seems to be a threat, in reality however, with a GMP accreditation, we can market our products to a much wider market overseas." (Respondt 7, 12 July 2005). In this regard, Respondt 7 described what GMP has done to foreign manufacturers of herbal and traditional products and the head start that these companies have made when compared to Malaysian manufacturers: "I was fortunate to

have visited China, Europe and other countries to learn in greater detail the production aspect of herbs and traditional medicine...From this visit, I learnt that these overseas factories had been practicing GMP many years ahead of us and that their products were sold in international markets, including in Malaysia".

Respondt 9, on the other hand, related the favorable impact of GMP standards used in Malaysia with the performance of her business in foreign countries. According to Respondt 9, "Products coming out of GMP compliant factories in Malaysia can more easily enter the international markets. [So] indirectly, yes, with GMP compliance, we are much more successful in marketing our products to the foreign countries." (Respondt 9, 24 July 2005).

In addition, Respondt 3 saw in the GMP a strategy to combat stiff competition. This Respondent mentioned that, "Competition in this industry is very stiff. That's the reason why we have made ample early preparations to overcome it. We have ensured that our factory is ISO 9002 and GMP compliant and have embarked on nationwide marketing." (Respondt 3, 29 June 2005). Furthermore, GMP enables businesses to produce in their accredited factories the products of other companies and thereby further contributes to their bottom line.

Conversely, GMP was also regarded as a threat to the practitioners of biotechnology in Malaysia. Respondt 2 (21 June 2005), for example, cited survival as a reason for complying with GMP. According to this Respondent: "In my opinion, this is not even a question of success, but more so a

question of survival! If you do not possess GMP [certification], you cannot produce [traditional] products and as such, you cannot survive. In other words, GMP does impinge on the success of a particular business in this field”.

To exacerbate matters, GMP compliance is not an easy matter and costly to implement as stated by Respondt 2 as follows:

“The primary issue or question with regards to the pharmaceutical field, especially in the traditional field, is the compliance to the requirements of GMP. In order to raise a factory that is GMP compliant, a big upfront expense is required. It is almost to the tune of RM5 million!” (Respondt 2, 21 June 2005).

In addition, a business has to worry about the location of its factories since it was perceived that in order to comply with GMP, manufacturing facilities must be located in industrial zones. According to Respondt 2. “If we refer to the terms of GMP, all factories need to be located in an industrial zone.” In order to overcome the above constraints imposed or deemed to be imposed by the GMP, the Respondent required significant additional financial resources and related coaching assistance in order to implement GMP. He further added, “With the ever tightening of the terms of GMP, companies require even bigger financial resources to continue operating. As such, we require technical assistance, funding and much more, in order to continue with our operations.” (Respondt 2, 21 June 2005).

If the mentioned financial assistance and coaching services are not forthcoming, many entrepreneurs,

particularly *bumiputeras*, will be adversely affected. With this regard, Respondt 2 cautioned that:

“If you were to survey, at this point in time there are more or less 38 *bumiputera* companies that are members of PURBATAMA [acronym for *Persatuan Perubatan Tradisional Bumiputera Malaysia*]. Out of these there will be many that will close shop because they cannot comply with the terms of GMP. Maybe only 10 would remain!” (Respondt 2, 21 June 2005).

While the above constraints represent what new enterprises will have to contend with, the Respondents interviewed in this study have identified and obtained help from various sources of assistance in their bid to comply with GMP requirements. Respondts 2 and 7 resorted to linkages and collaborations with researchers at local universities in order to obtain the required coaching with GMP compliance. According to Respondt 2: “This university not only helps in the aspect of GMP compliance, but also works hand in hand with the entrepreneurs to ensure that the *bumiputera* companies [in this area] will continue to survive when the GMP is fully enforced to all traditional entrepreneurs (*according to Drug Control Authority, Ministry of Health (DCA) classification for drug manufacturers*)” (Respondt 2, 21 June 2005).

Respondt 5, on the other hand, relied on the Ministry of Health for similar help. According to this respondent:

“The two companies receive a lot of help from many parties, particularly from the government, via the Ministry of Health and many more.

Aid and assistance of this nature are important to enable entrepreneurs, like me, to implement GMP. If not for this help, how would I implement GMP?" (Respondt 5, 4 July 2005).

In summary, GMP compliance was a much discussed topic by all respondents who deemed it as an important factor that affects their performances. Even though the respondents voiced out the costly initial investments in compliance and the need for continuous technical coaching, they were also quick to point out the benefits of greater market access to their products and increased revenue from contract manufacturing. With enhanced awareness of consumers of the issues of product quality and safety, GMP compliance is clearly a factor that contributes to the success of the biotechnology industry in Malaysia.

Halal Certification

The Malaysian biotechnology market includes a significant Muslim segment. Products that are targeted for use by this segment must comply with the *halal* prescriptions as set by the relevant religious authority in Malaysia. In view of this, entrepreneurs who wish to do well and tap the Muslim market will want to obtain the *halal* certification. In addition, the certification will mean that the entrepreneurs can expand their exports to other Muslim countries as well. In this qualitative study, it was apparent from the Respondents' comments that *halal* certification was deemed as a crucial success factor to their businesses. According to Respondt 9, "...since *halal* itself denotes cleanliness [&] purity. [&] this is especially important in the Islamic markets, includ-

ing Malaysia." (Respondt 9, 24 July 2005).

By complying with the *halal* prescriptions, customers are assured that the products produced by an enterprise have been manufactured according to the dictates of the religion of Islam. Respondt 3 (29 June 2005) further added:

"The *halal* label is definitely required despite the fact that the products we produce undergo herbal preparations". "The consumers would be more convinced that all products do not contain materials deemed forbidden by religion, such as, alcohol and the like. Even though our name reflects the Malay race, and our customers are primarily Malays, we want to really convince consumers that all of our products are assured *halal* and pure."

Respondt 9, despite being a non-Muslim, nevertheless understood the importance of processing her products the *halal* way. She provided some examples of how the *halal* concept was being practiced by her enterprise. She elaborated that." [name of the enterprise is withdrawn] is an early recipient of the *halal* certification issued by JAKIM [*Jabatan Kemajuan Islam Malaysia*]. OK. [Mr.] [name of the Operations Manager is withdrawn] is the person responsible in ensuring that all products of this company are *halal*. In fact, the concept of *halal* is not only restricted to the raw materials that we use but extended to encompass the methods used in the cleaning process. For instance, the different brushes and cleansers that we utilize must also be made of *halal* materials as well. It is my contention that [Mr.] [name of the Operations Manager is withdrawn]

is probably more knowledgeable on *halal* compliance than many of the Muslim entrepreneurs themselves!” (Respondt 9, 24 July 2005).

Halal certification is found to be a contributing factor to the success of the biotechnology business in Malaysia. As a Muslim country with a significant Muslim market, awareness of the need to use *halal* products is high among its Muslim nationals. As such, entrepreneurs are forced to comply with the *halal* prescriptions in order to gain the trust of their Muslim customers and thereby ensuring the success of their businesses. *Halal* is also associated with cleanliness and purity. Products that are *halal* certified can find their way into the markets of other Muslim countries.

Enterprise Strategies

An internal success factor to any enterprise seeking maximum returns is the strategies adopted by its management. In this qualitative study, the Respondents identified eight strategies that were adopted by them which had contributed to the success of their biotechnology SMEs. These strategies are access to financial capital, government assistances, linkages, innovation activities and vertical integration.

Access to Financial Capital

Access to financial capital is a primary business strategy for achieving success (Aldrich and Auster, 1986). Lussier (1995) in his study argued that undercapitalised enterprises have a greater chance of failure than enterprises which started out with adequate capital. The criticality of capital access was

similarly a key consideration of all the Respondents interviewed in this study. Respondt 5 (4 July 2005) was succinct when he said, “Another factor which I believe is important is the adequacy of financial resources. If not for adequate capital, nothing can be done.” Equally candor was the comment from Respondt 7. According to him (12 July 2005), “One additional factor that enables us to persevere is the adequacy of financial resources. If there is not enough capital, the enterprise can be likened to a car with insufficient petrol. It cannot move and will not get any further.” As to the sources of the much required capital, the same Respondt said, “We receive aid from the government, banks, and even individuals or private enterprises.”

Respondt 2 was of the opinion that mere reliance on the member partners as a source of capital is inadequate. He also singled out the government and the banks as the other required sources of financial capital. According to Respondt 2 (21 June 2005), “**Mere reliance** on the contribution of member partners is inadequate. In short, financial assistance from either the government or banks can help businesses to be successful.”

In the current Malaysian biotechnology scenario characterized by ever stringent quality and safety controls, it is a requirement of biotechnology SMEs to comply with a set of standards issued by the Government of Malaysia called the Good Manufacturing Practices (GMP). To achieve GMP accreditation, an SME has to incur additional expenses to adequately equip and run its factory in line with the guidelines. Respondt 2 highlighted

the need to obtain sufficient capital to cater for this. According to him, "With the ever tightening of the terms of GMP, companies require [even] bigger financial resources to continue operating. As such, we require technical assistance, funding and much more, in order to continue with our operations." (Respondt 2, 21 June 2005).

Some respondents (Respondts 3, 4, 6 and 8) stressed the importance of capital for expansionary plans. In this matter, Respondt 6 had this to say, "Even though small, in order for a company to expand, we require an injection of external capital. In this regard, our company receives external financial help that allows us to expand, as can be seen today (Respondt 6, 8 July 2005)." Yet Respondts 4 and 9 identified adequate capital as necessary for enterprise success, especially through new market ventures. Respondt 9 stated that, "I think among other good reasons why we managed to penetrate these new markets are opportunities, good planning and enough financial resources. These factors are very important for expansion." (Respondt 9, 24 July 2005).

Among the barriers to capital access, the respondents cited the legal set-up and age of the enterprise. According to Respondt 2 (21 June 2005), an enterprise that is registered as a Private Limited Company will have easier access to financial capital as compared to other legal set-ups. He stated that: "In contrast to sole proprietorship and partnership, a company registered as a *Syarikat Sendirian Berhad* (Private Limited Company) tends to obtain aid and support from banks and the government much more eas-

ily. This is so because a private company is more cohesive in its management and looks more robust."

An older enterprise would, other things remaining the same, fare a better chance at obtaining financial help versus a new enterprise. Respondt 8 (18 July 2005) commented:

"At that time, this company was not that well known and the industry too did not receive the extensive publicity that it is now getting. Because of this, it was extremely difficult to secure an external source of capital. We were quite lucky when we managed to bring in a new partner that already had an existing factory. From there, we were successful in moving forward a little bit."

In order to obtain ample financial resources, Respondts 4 and 8 associated them with good planning strategies. According to Respondt 4:

"In order to possess adequate amount of financial resources, we need to plan. And I believe that all businesses must have well thought out business plans. It is through the planning process that we are able to, not only plan the undertaking of the operations and strategies of the business, but also the amount of funds that will be required". (Respondt 4, 1 July 2005).

And this is what Respondt 8 (18 July 2005) had to say:

"That's the most primary thing to do! In order to do anything, we must plan. If not for planning, how could one survive? How do we convince an external party to extend loans?"

Government Assurances

Based on an earlier study, it was found that technology-based

SMEs generally grow faster than non-biotechnology SMEs. By virtue of this, governments are encouraged to lend in their assistances (Phillips, 1991). In Malaysia, government assistance of technology-based SMEs come in the forms of loans and grants for R&D activities, provision of information and other advisory services (Osman, 2002). In this qualitative study, respondents overwhelmingly identified the Ministry of Health as among the key ministries that channel much support to them. In particular, this support centres on guidance pertaining to compliance with industry standards as set by the government. As an example, this is what was commented by Respondt 7, “I also received much assistance from the Ministry of Health on the GMP aspect that has to be complied by all manufacturers of medicine.” (Respondt 7, 12 July 2005).

The Respondts 2 and 6 also cited the lack of much needed additional resources for business expansion as a reason for seeking help from the government. According to Respondt 6, “Indeed there are aids from the government. This is particularly true during the early years of our expansion. I feel that these aids are very useful to companies like us.” (Respondt 6, 8 July 2005).

In addition, help is also required from the government to aid and support the implementation of GMP in their respective businesses. According to Respondts 5: “The two companies receive a lot of help from many parties, particularly from the government, via the Ministry of Health and many more. Aid and assistance of this nature are important to enable entrepreneurs, like

me, to implement GMP. If not for this help, how would I implement GMP?” (Respondt 5, 4 July 2005).

Other than financial aid and support of the GMP implementation, the respondents detailed other types of governmental supports that they have received and the benefits that they have derived from these. Examples of these other supports include the sponsoring of seminars, expositions, trade missions and business networking. Respondt 9 said: “Government assistance comes in many ways. There are seminars, expositions, trade missions, and business networking and so on. Therefore, we at [name of the enterprise is withdrawn], try to take these opportunities to expand our business especially to new markets that we wish to enter. In Malaysia, we are so lucky that there are many government agencies helping SMEs like [name of the enterprise is withdrawn]” (Respondt 9, 24 July 2005).

It is the expectation of the Respondts that governmental supports in all of the mentioned ways would continue. According to Respondt 2, “The continuous support of the government is required by all traditional medicine entrepreneurs. Not just my own company.” (Respondt 2, 21 June 2005).

Other than the government, Respondts also receive support from banks, individuals and private enterprises. In this juncture, Respondt 3 (29 June 2005) commented, “Our business does receive a lot of external assistance, not only from the government, but also from individuals and the private sector. In fact, there are also other companies that chip in.”

During this formative period in the history of biotechnology thrust in Malaysia, financial and non-financial support from the government is crucial to the success of biotechnology SMEs in Malaysia. This qualitative study has extracted ample testimonies from respondents to the effect that governmental support has made a big difference to their business performances. It is also an expectation that this support will continue to be provided. This study has also found that Respondents also receive support from other parties, such as private enterprises and individuals.

Linkages

The next important success factor for Malaysian biotechnology SMEs is the array of collaborations which the enterprises undertake with each other; universities and research institutions; and individual researchers from these seats of learning. It is the contention of the majority of the Respondents that collaborations of the kinds mentioned have helped their individual businesses in many ways.

Linkages With Other Private Enterprises

Realising the resultant benefits of intra-industry collaborations to the success of her business, Respondt 8 (18 July 2005) resorted to short term courses as a means of building up rapport and a network of contacts with members of the same industry. According to Respondt 8, "From the courses such as these, we can also make contacts with others, or even different businesses that can help to make this company successful." Accordingly, Respondt 2 discovered

that linkages with members of the same industry have enabled his business to receive help and support from them. He said, "However, the majority are more involved in business networking and in the traditional medicine entrepreneur's movement, which functions collectively. It is easier to apply for assistance and support if one functions collectively". (Respondt 2, 21 June 2005).

Linkages With Academic Research Institutions

Three respondents mentioned that collaborations with universities and other research institutions yielded benefits in terms of assistance, product quality enhancement through R&D, and many more. On the ongoing nature of such collaborations, Respondt 5 (4 July 2005) said, "Company [name of the enterprise is withdrawn] and company [name of the enterprise is withdrawn], also develop a close relationship with key parties that include the Ministry of Health, universities and relevant government agencies." For Respondt 2, collaboration with a particular university has enabled his business to receive guidance in operational aspects, including in particular, the compliance to the earlier mentioned GMP. According to Respondt 2: "For company [name of enterprise is withdrawn], we are lucky to receive direct assistance from the [university name is withdrawn]. This university not only helps in the aspect of GMP compliance, but also works hand in hand with the entrepreneurs to ensure that the Bumiputera companies in this area will continue to survive when the GMP is fully enforced to all

traditional entrepreneurs [according to Drug Control Authority (DCA), Ministry of Health classification for drug manufacturers] (Respondt 2, 21 June 2005).

Respondt 4, on the other hand, saw in the collaborations with universities and other research institutions an opportunity to upgrade the quality of his products and to tap their R&D expertise and facilities. He stated that, “In our endeavors to upgrade the quality and development of our products, we extensively work with the various agencies of the government, such as, SIRIM, the Ministry of Health, and various researchers from local universities. (Respondt 4, 1 July 2005). He further added:

“We believe that R&D is essential in this chosen field. We do conduct some level of R&D activities here, but this is still small. R&D requires sophisticated equipments and expertise. This requirement precludes most small companies, such as [name of the enterprise is withdrawn], from creating their own R&D departments and do R&D activities because we simply cannot afford. As such, we need to work together with the mentioned agencies or seek help from other research institutions.”

Collaborations with universities and other research institutions are also aimed at soliciting the support services and consultation from a group of experts from these reputable bodies. As told by Respondt 6 “Government agencies like SIRIM, MARDI and the Ministry of Technology and Innovation have many experts in various fields related to our business. Through the above mentioned activities, we establish a

network or contacts with those who are true experts that can help the company. Therefore, if we encounter any problems, we can deal directly with these individuals.”

The above findings are consistent with those of previous studies (e.g., Meeus, et al., 2004; Mian, 1997) where the relationship with established and reputable organizations such as leading research universities was found to have enhanced enterprise success. The study by George, et al., (2002) on 147 biotechnology enterprises showed that enterprises with university linkages reported lower R&D expenses while having higher levels of innovative outputs. This enabled the enterprises to reduce their overall costs and achieve superior success. Peters & Becker (1998) highlighted a strategy widely used by technology-based enterprises to develop close linkages with universities than can offer flexibility in conducting R&D activities. Moreover, linkages with universities give the enterprises a window on emerging technologies and scientific discoveries (George et al., 2002).

As an appropriate ending to our discussion on the collaboration with universities and research institutions, it is worth noticing that the services rendered by these bodies are, according to Respondt 2 (21 June 2005), beyond expectations. He said: “This university not only helps in the aspect of GMP compliance, but also works hand in hand with the entrepreneurs to ensure that the *Bumiputera* companies in this area will continue to survive when the GMP is fully enforced to all traditional entrepreneurs (according

to Drug Control Authority (DCA) Ministry of Health classification for drug manufacturers).”

Linkages with Personal Researchers of the Academic Research Institutions

Another aspect of collaboration involves the SMEs dealing directly with individual researchers from academic research institutions. Four out of nine respondents credited their personal linkages with researchers as having contributed to their success. According to Respondt 2:

“For company [name of the enterprise is withdrawn], we are lucky to receive direct assistance from the [name of the university is withdrawn]. This university not only helps in the aspect of GMP compliance, but also works hand in hand with the entrepreneurs to ensure that the *Bumiputera* companies in this area will continue to survive when the GMP is fully enforced to all traditional entrepreneurs [according to Drug Control Authority (DCA) Ministry of Health classification for drug manufacturers)”. (Respondt 2, 21 June 2005).

The existence of such direct dealing on the part of the Respondts was intimated by Respondt 2 (21 June 2005) when he remarked wryly to a question from these researchers, “Yes! I believe that’s something you are well aware of [smile]!”

Direct contacts with research experts or technologists have similarly benefited Respondt 3 (29 June 2005). In this case, this Respondt stated that:

“[Name of the enterprise is withdrawn] knows quite a number of technologists who are experts

in this field. From time to time, the advice of these experts is required in order to increase production and the quality of our products. As I mentioned earlier, we do not possess all the expertise in-house nor are we capable of acquiring such required expertise. As such, when a particular skill is required, we will outsource it. and one of the ways is through the contacts that we have made with these experts or technologists.”

Respondt 6 identified short term programs like courses, seminars, and trainings as hotbeds for the cultivation of valuable contacts with such researchers. According to Respondt 6 (8 July 2005), “In addition, it is through these types of activities that the company can strike a relationship with particular experts that can help our business.” This same respondent further admitted to the indispensability of these researchers to the success of his business. This finding resonates with that of an earlier study which found that a relationship of the manner discussed above would give the enterprise not only access to diverse resources, but also sometimes at cheaper prices than the market rates (Geisler, 1995). Respondt 6 pointed out: “Government agencies like SIRIM, MARDI and the Ministry of Science Technology and Innovation have many experts in various fields related to our business. Through the above mentioned activities, we establish a network or contacts with those who are true experts that can help the company. Therefore, if we encounter any problems, we can deal directly with these individuals”.

Respondt 7 mentioned specific examples of personal contacts that

have aided him to further develop his business. According to Respondt 7 (12 July 2005):

“I also maintain numerous contacts with government agencies, universities and individuals who can assist in raising the business. As an example, in the aspect of GMP, I have received a great deal of assistance from Professor [name of the researcher is withdrawn] from [name of the university is withdrawn]. In like manner, I receive help from the Ministry of Rural Development, JCorp [Johor Corporation] and others.”

As borne by the interviews, these researchers can safely conclude that in general, collaborations between other private enterprises and reputable centers of learning and research and their researchers/technologists do contribute to the development and success of biotechnology businesses in Malaysia. In line with prior studies, the findings from this qualitative study also suggested that such collaborations benefit both ways and represent a win-win situation where the objectives of both parties are achieved (George et al., 2002). Scientists employed by universities to conduct research into existing and emerging technologies have now the opportunity, through these linkages, to develop and test their theories, hone their skills, train and place their students (George et al.). In some cases, linkages with enterprises may also generate the funds needed to pursue important R&D projects and improve the quality of a university's research and teaching (Mansfield and Lee, 1996).

Innovation Activities

R&D

In general, the respondents interviewed found that R&D played an important role in their success. Respondt 9 (24 July 2005), for example, posited that, “I think, among others, are: our very own R&D facilities, manufacturing plant, product formulations, beauty centers, academy and our distributor of beauty equipments.” She further elaborated about her R&D initiatives and provided examples of how R&D has been able to contribute to her current success:

“R&D is a major component in this industry. In fact, our R&D facilities are ISO 9001 and *halal* certified. All our products are free from alcohol and animal by-products [or derivatives]. Performance-driven and safe products of superior quality with high efficacy are the result of continuous concerted efforts by our team of chemists and microbiologists in R&D as well as stringent quality testing. Our R&D effort has also been recognized by the government and was bestowed the “Industry Excellence Award 2000” by the Ministry of International Trade and Industry (MITI); thus giving global status to our skincare products.”

In view of the fact that all the Respondts market their products in the open market, there was unanimity in their views on the necessity of enhancing their R&D activities in order to provide them with the required edge over their competitors. In this regard, Respondts 3 posited that: “In dealing with competition, we need to continuously outdo the other compa-

nies. Once we enter the market, there will always be those parties who will quickly copy our products and even our labels in order to steal our customers. The R&D unit of [name of the enterprise is withdrawn] needs to create and register three products in a month. Each month, we will create a new formula and try to offer it in the market.” (Respondt 3, 29 June 2005).

Respondt 8 (18 July 2005) mentioned the specific amount of money that she spent on R&D activities for her biotechnology enterprise. She stated that, “Each year, the company spends an average of 3 to 5 percent of its sales [revenue] amount on R&D activities. We coordinate these R&D activities ourselves based on the needs of the company. I think R&D is an important element for this type of industry to come out with products that are able to meet customer needs.” Both Respondts 8 and 9 related R&D activities with their perceived level of competition in the biotechnology field. According to Respondt 9, “Competition is very stiff. That is why you need to come out with new products, good R&D and right strategies for expansion. Furthermore, you must have passion in the business.” (Respondt 9, 24 July 2005).

Another aspect of R&D is the need to be in tandem with changes in customer needs. In this regard, Respondt 8 (18 July 2005) saw R&D as a means of responding to this ever changing need and the creation of highly marketable products. According to her: “Our R&D unit will act according to the need of our customers and come out with new range of products that are highly

marketable. In this regard, our R&D and marketing units work together to understand the development of customer taste.”

Respondt 8 further elaborated on how R&D has contributed to the success of the enterprise by offering optimal product value for money to customers as well as meeting their needs:

“If users find that the price that we are charging for a particular product is higher than that of a competitor, our R&D unit will think about reducing the price but not at the expense of quality. Biotechnology is a very dynamic field. In order to survive, let alone flourish, we need to be able to compete and enhance R&D activities that can improve the quality of existing products. In addition, we need to constantly offer products or services that truly meet the needs of the customers.”

The sentiments expressed by Respondt 9 were similarly shared by Respondts 7 and 2. According to Respondt 7:

“From my observation and the various courses that I have attended, I find that customer tastes are ever changing. Knowing this, we need to be constantly aware of such needs of our customers and always be prepared to make the required enhancement or modification to our products to suit them”. (Respondt 7, 12 July 2005).

Our discussion on R&D thus far centred mostly on its roles in reacting to market demand changes and thereby ensuring the continued competitiveness and profitability of enterprises. R&D however, is a costly affair and respondents were quick to highlight this fact. According to these Respondts, costs and expertise

are the primary considerations for the creation of one's own R&D unit. This is what Respondt 8 had to say: "Company [name of the enterprise in withdrawn] has an adequate workforce that is equipped with training in the required fields. However, critical tasks such as marketing management, R&D, the operations and factory management are entrusted to those who are truly experienced and experts in the respective fields." (Respondt 8, 18 July 2005).

The pre-requisite expertise mentioned above was discussed by Respondts 8 and 5. They shared information with the researcher on how such expertise was acquired by their respective businesses. According to Respondt 8 (18 July 2005), "My managerial experience at [name of the Government Research Institute is withdrawn] is being utilized in this company. And so is my experience in R&D work and operations." Respondt 5 further added: "We make it a continuous effort to enhance product quality and make new changes to existing products. The two companies, [name of the enterprise is withdrawn] and, [name of the enterprise is withdrawn], also develop a close relationship with key parties that include the Ministry of Health, universities and relevant government agencies. On top of that, we also have our own expertise in R&D work". (Respondt 5, 4 July 2005).

Despite the overwhelming concurrence on the benefits of R&D, Respondt 8 (18 July 2005) at least felt that investments made in R&D per se do not guarantee a favorable outcome all the time. She commented: "I would not put that as 100% true.

There were new products created that did not receive the anticipated response. Nevertheless, we need to be confident that each person has a different taste. As such, by providing a wide range of products and making constant changes to keep pace with customer taste, we believe, God willing, we can succeed."

In addition, for SMEs, investment in R&D itself may be too prohibitive despite its inherent benefits. According to Respondt 4:

"We believe that R&D is essential in this chosen field. We do conduct some level of R&D activities here, but this is still small. R&D requires sophisticated equipments and expertise. This requirement precludes most small companies, such as [name of the enterprise is withdrawn], from creating their own R&D departments and do R&D activities because we simply cannot afford." (Respondt 4, 1 July 2005).

Product Newness

Still on the subject of innovation activities, these researchers now look at product characteristics that contribute to the success of Malaysian biotechnology SMEs. One of this is the "wow!" factor of product newness. Product newness and innovation are closely linked to R&D. Respondts 3 and 5 commented on this. According to Respondt 3, "It is in this R&D unit that we spawn new products that are different from those offered by others." (Respondt 3, 29 June 2005). With the creation of new products, Respondt 2 (21 June 2005) believed that this would put any enterprise in a better position *vis a vis* its competitors. He commented that, "R&D can help develop many new products and this can boost our

competitiveness.” Respondt 1 on the other hand, linked product newness to the perceived level of competition. According to Respondt 1, “Being able to be the first to the market is very important in this industry as competitors are very intense.” (Respondt 1, 15 June 2005).

Product Uniqueness

New products and unique products have something in common. Both cater to the whimsical needs of customers and both confer the enterprise producing them with a significant competitive edge over its competitors. Hence, enterprises seek desperately, via R&D, to be a step ahead of competition with the creation of ever new and unique offerings. The following Respondt 3 emphasized the role of R&D in meeting the needs of the market place for unique products:

“The R&D unit of [name of the enterprise is withdrawn] needs to create and register 3 products in a month. Each month, we will create a new formula and try to offer it in the market. It is in this R&D unit that we spawn new products that are different from those offered by others”. (Respondt 3, 29 June 2005)

The next few respondents (Respondts 4, 7 and 8) cited product uniqueness as having attracted customers to their products and thereby contributed to the success of their businesses. According to Respondt 4:

“The primary success factor of [name of the enterprise is withdrawn] is the unique characteristic of the product itself. I believe all of us trust gamat and have used it before as a medicine to heal lacerations, including internal lacerations, and various types of skin

diseases. As such, when we decided to produce *gamat*-based products in a readily usable form, we received quite a good acceptance, not only from the customers in [name of the place is withdrawn], but also from all parts of Malaysia.” (Respondt 4, 1 July 2005).

It is evident from the above discussion of innovation activities that much emphasis is put on R&D among the Malaysian biotechnology SMEs as a catalyst to scope in the varying needs of customers and consequently capitalize on these needs with the creation of new and unique products. In an industry known for its high level of competition, R&D activities become all the more important for the survival and competitiveness of biotechnology SMEs.

Vertical Integration

One other enterprise strategy embarked by Malaysian biotechnology SMEs was vertical integration. Vertical integration here included both forward and backward integrations. An example of an entrepreneur who adopted vertical integration as an enterprise strategy is Respondt 9. In her case, Respondt 9 chose vertical integration as one of the growth strategies to achieve greater success. According to Respondt 9 (24 July 2005):

“[There are] many factors. You cannot say one factor is superior to the others. Everything must come together to make the business a success. I think, among others, are: our very own R&D facilities, manufacturing plant, product formulations, beauty centers, academy and our distributor of beauty equipments.”

For a biotechnology business, vertical integration can take on many forms. Respondt 3 (29 June 2005) provided examples of these:

“By integration, I mean the integration of other businesses with the existing business that I have right now. For example, in the past we used to procure plastic bottles from other suppliers. Now we have established our own plastic factory that can cater the plastic container needs of [name of the enterprise is withdrawn]. This factory is run by one of my children.”

The example of a vertical integration as mentioned by Respondt 3 was supported by Respondt 7. Here’s what he had to say:

“To me, that’s another way of expanding. I find that expansion in a related field is profitable. For instance, if previously we have been buying a certain material from someone else, we now make it ourselves. In this way cost becomes lower and we can ensure that the material meets our specifications. Any excess production of this material can be sold off to other factories.” (Respondt 7, 12 July 2005).

As to how vertical integration was able to contribute to the success of her enterprise, Respondt 9 (24 July 2005) provided the following insights, “We go into businesses that we are good in them. Each business unit will supplement and complement the other. I think that is a win-win situation within our business.” The impact of vertical integration to a business was further expounded in detail by the same Respondent:

“I think that our beauty salons, which is the biggest beauty chain with more than 46 beauty centers throughout

Malaysia and with affiliates in many countries around the world; is our niche. That also won us the Keris Award in 2002 as an Honesty Enterprise for the Asia Pacific International category. [Name of the enterprise is withdrawn] has also been recognized by Readers Digest’s Superbrands for 2003/2004.”

In identifying the appropriate vehicles to achieve growth via vertical integration, the respondents decided on the establishment of new and separate business entities characterized by their own groups of management teams.

In most cases, these new entities functioned as distribution or marketing centres for the products manufactured by the entrepreneurs. As elaborated by Respondt 6:

“The marketing aspect is wholly being handled by the other marketing company. At this point in time, I am personally managing the marketing company. Needless to say, marketing is very important. It is because of this reason that we established a separate company that is wholly responsible for the marketing of the company’s products in [name of the city is withdrawn].” (Respondt 6, 8 July 2005).

When queried further as to why he chose to establish separate marketing units, this respondent provided various reasons. These included the need for the entities to focus entirely on the marketing aspect, the need for more effective marketing methodologies, and the ability to market products of other companies using their own brand names. According to him:

“If it is just production, then anyone can do it! However, to sell products is very difficult. As such,

I have divorced the marketing unit from production in order to fully concentrate on marketing activities. The marketing unit is really the primary mover of the company...The function of this unit is to market all products that come out of our factory in [name of town is withdrawn] as well as to identify new products required by consumers. If the required products are not produced by us, we will procure them from other manufacturers, repack and market under our own brand.” (Respondt 6, 8 July 2005).

In addition, Respondt 8 postulates that, “I find that a multi level marketing approach or direct selling has a greater potential to market our products.” (Respondt 8, 18 July 2005). Of the respondents, Respondt 9 was among those that have successfully expanded their businesses internationally. One of the reasons cited by Respondt 9 (24 July 2005) for embarking on geographical diversification was:

“For those who are accustomed to the products of [name of the enterprise is withdrawn], they will continue to seek and use the same products wherever they happen to be. It was after realizing the existence of such a demand from the markets of Brunei and India that we decided on our business expansion in the two countries.”

The choice of geographical location, in turn, was influenced by the existence of new markets that have potentials for further growth. The entrepreneur further explained, “We are also targeting new and growing locations and markets like China and India for our operations.” (Respondt 9, 24 July 2005).

The respondent also mentioned the modus operandi involved in these overseas ventures. According to her:

“That is why I see by becoming franchisor, you will be able to expand your operation not only locally, but also overseas, and at the same time, having control of the businesses. In my case, it is the products and services that we offer to our customers. No matter which branch you go, you will get the same quality of products and the same treatment by [name of the enterprise is withdrawn]. I think the franchise system itself also contributes to our success.” (Respondt 9, 24 July 2005).

Organizational Structure

A surprising find from the interviews indicated that organization structure may not have a bearing on a biotechnology business’ success - at least not directly. This is evident in the way the majority of the respondents chose not to directly dwell on how particular organizational structures can affect their individual performances. On the contrary, Respondt 2 even found the need to emphasize that there were businesses that have failed despite having well structured organizations. According to Respondt 2 (21 June 2005), “An organization structure is imperative for all types of organizations. Nevertheless, there are businesses that fail despite having well structured organizations!”

A somewhat indirect link between organizational structure

and business success was provided by Respondt 8. This respondent saw the positive impacts of empowerment and greater freedom to business - things that only come about from an accommodating organization structure. Commenting on an organization that values empowerment, Respondt 8 (18 July 2005) said, "That's the structure that we came up with, since starting up operations. In my view, if we have a capable workforce that can function without too much supervision." She further added:

"Employees should be given some freedom to express views, and in some specific cases, allowed to make own decisions. I am sure that the philosophy and objectives of the company are well understood and appreciated by all the staff of this company. We can [safely] say that 90% of the company workforce has been with the company for more than five years."

Recognizing the need for an organization to be flexible in changing circumstances, Respondt 9 mentioned the sharing of management responsibilities when the company embarked on its local and international expansion plan. According to her: "Well. When you are small, you can control [almost] everything. I did that when we first started the business. However, when we expand and start to develop new expansion strategies, you need to let the others manage your businesses as well. That is why I see by becoming franchisor, you will be able to expand your operation not only locally, but also overseas, and at the same time, having control of the businesses "(Respondt 9, 24 July 2005).

Analysis

The NVivo7 Qualitative Data Analysis Software was used to aid in the identification, condensing and analysis of the interview data in order to address the research questions. The transcribed data from the interviews were divided into nine separate documents according to the number of respondents. Each document was opened separately and coded.

Grounded theory uses three levels of coding. Initially, open coding is adopted. This is the stage where the transcripts are examined and coded via a process which breaks the interview into discreet threads of datum. These data are eventually collated and accrue to form categories of similar phenomena. The process of open coding examines the data without any limitations in its scope and without the application of any filters. Thus all data are accepted. As the categories begin to fill, those that are most dense become known as core categories (Glaser, 2001).

As core categories become apparent, the researcher moves to the second level of coding, known as selective coding. Selective coding allows the researcher to filter and code data which are determined to be more relevant to the emerging concepts. Therefore only the most relevant parts of a transcript are used and coded, and to facilitate this, interview questions are continuously reformulated to include the new and more focused direction of the research.

The final stage of coding is known as theoretical coding. Theoretical coding occurs when core

Table 3. Integration of Themes

Themes	Integrated Into
Trusted	C ₁ : Enterprise Image
Well Known	
Original Products	
Product Quality	
Committed Employees	
Safe for Consumption	C ₃ : GMP Compliance
Product Uniqueness	C ₇ : Innovation Activities
Product Newness	
R&D	
Growth in Product Lines	G ₁ : Growth in Sales
Continuous Product Improvements	
Product Diversity	
Contract Manufacturer	
New Markets	

Table 4. Tree Nodes from Interview Transcripts

No.	Tree: Parent (P), Child (C) & Grandchild (G)
1.	P: Enterprise Success
	C ₁ : Financial Profitability
	C ₂ : Enterprise Growth
	G ₁ : Growth in Sales
	C ₃ : Satisfaction
2.	P: Property-based Resources
	C ₁ : Enterprise Image
	C ₂ : GMP Compliance
	C ₃ : <i>Halal</i> Certification
3.	P: Organizational Structure
	C ₁ : Organic Structure
4.	P: Enterprise Strategies
	C ₁ : Access to Capital
	C ₂ : Innovation Activities
	G ₁ : R&D
	C ₃ : Linkages
	G ₁ : Linkages with Other BioSMEs
	G ₂ : Linkages with Universities or Research Institutions
	G ₃ : Personal Linkages with Researchers of University or Research Institutions
	C ₄ : Government Assistances
	C ₅ : Vertical Integration

Source: Current study.

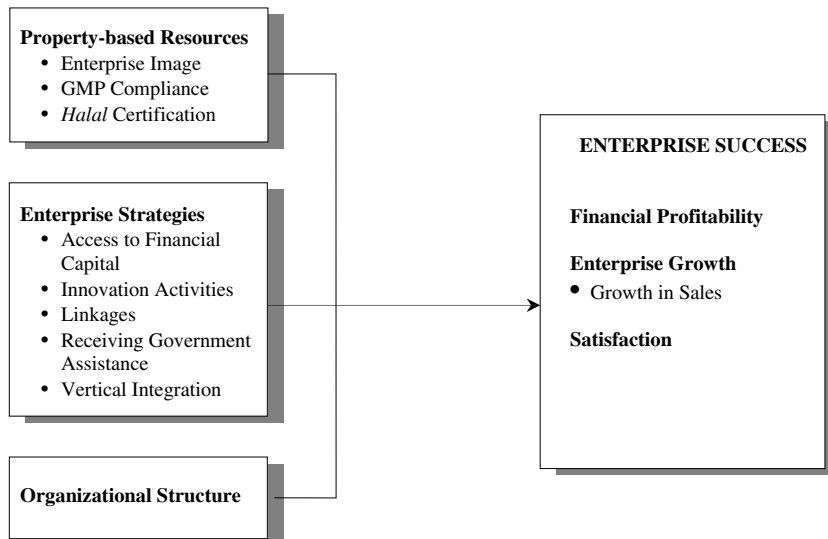
categories have become saturated. Saturation is both a peculiarity and strength of *grounded theory*. Unlike other methods of qualitative analysis which acquire rigour through multiple levels of confirmation or triangulation (Mertens, 1998), *grounded theory* builds on the analytical case by constantly seeking new categories of evidence. Eventually, after a period of data collection, a point is reached when no new data are forthcoming. This is the point of saturation. “One keeps on collecting data until one receives only already known statements.” (Selden, 2005 p. 124). Theoretical coding examines these saturated categories for conceptual relationships between categories and their relevance to the literature (Glaser, 2001).

Initially there was no attempt to combine or eliminate the themes that emerged from the interview

transcripts. However, when the full list of themes had emerged, the process of integration and screening began. During this stage, any doubtful theme was left to stand alone rather than being eliminated or integrated. Consequently, 14 themes were integrated into 4 themes, thus reducing the number of themes to 21. The integration of themes is shown in Table 3. Again, the guiding principle was, “when in doubt, don’t integrate or eliminate.” Next, the themes were integrated into Tree Nodes representing Parent (P), Children (C), and Grandchild (G) nodes.

Eventually, the total list of 21 themes was segregated into 4 Parents, 12 Children and 5 Grandchildren nodes. Again, the researcher’s guiding principle was to retain all doubtful themes. The final Tree Nodes is shown in Table 4.

Figure 1. Conceptual framework for enterprise factors contributing to the success of biotechnology SMEs in Malaysia.



Conceptual Framework

As a result of the qualitative study, a new conceptual framework on entrepreneur's factors contributing to the success on biotechnology SMEs is constructed as shown in Figure 1.

Conclusion and Recommendation

In summary, qualitative study serves to explore the enterprise factors that contribute to the success of Malaysian biotechnology SMEs and thereby helps to develop conceptual framework used in the study. As mentioned, the qualitative study was carried out according to the *grounded theory* methodologies originated from the works of Glaser & Strauss (1967) and Strauss & Corbin (1994). *Grounded theory* is a unique qualitative research methodology which provides a systematic means of developing a theory that is grounded in the data, with or without the interference of predetermined categories. As such, the techniques of *grounded theory* are especially useful for this study. These interview transcripts yielded three main themes related to the enterprise factors that contributed to the success of biotechnology SMEs in Malaysia. **The themes are:** property-based resources, enterprise strategies and organizational structure. **A conceptual framework** was subsequently crafted to provide plausible explanations of enterprise competitive advantage through its exploitation of internal resources and capabilities.

Several limitations arising from the nature of the research and the industry involved deserve attention. These limitations also point to opportunities for further research in this area. *Firstly*, the fact that the Respondents may choose not mention certain strategies or factors during the semi-structured interviews does not in itself mean that they do not exist. Hence, a more standardised questionnaire could be of assistance for further research. *Secondly*, this cross-sectional research that involves face-to-face interviews is not without its shortcomings. The main disadvantages of face to face interviews are the possible distortions in responses caused by personal bias, anger, anxiety, and politics. Distortions can also come about from the simple lack of awareness, since interviews can greatly be affected by the emotional state of the interviewees at the time of the interviews (Patton, 2002). This research too was conducted at a time when biotechnology was receiving great attention from the government. This factor alone could affect the perceptions of the respondents towards biotechnology as a whole and could also distort their views on the determinants of enterprise success.

The third limitation of this research is its entrepreneur-centricity. It assumes that the entrepreneur is the dominant figure who determines the success of the enterprise. It is obvious that this assumption fails to include the myriad of set-ups that characterize the SMEs in Malaysia. SMEs that operate without a dominant player or SMEs that are owned and managed by a team of

entrepreneurs would be left out unwittingly. It is therefore important that future research looks into the impact of owner-manager teams on biotechnology enterprise success. In addition to the above, this research does not address the impact of entrepreneurs who own multiple enterprises. It is possible that due to diversion of effort, attention & resources, enterprise success is affected. Hence, future research on technology-based entrepreneurship should investigate the impact of multi-enterprise ownership. Future studies may also attempt to test the theory and variables developed in this study through a large-scale quantitative survey or through further in-depth qualitative studies. Next, it is recommended that a longitudinal study be carried out to validate the framework of successful biotechnology SMEs in Malaysia. While this type of research has

been done in the Malaysian context, an international replication of the research may provide interesting insights.

With regard to methodology, the rich findings of this study imply that *grounded theory* can be a useful analysis tool for several areas in management research, in particular when the aim is to address questions about the meaning and context of social phenomena. Furthermore, such projects need not be limited to single settings, but can also include a cross-cultural perspective, as demonstrated in the study described here. Future research may also combine self-reports with other qualitative methods, such as participant's observation, because replies to interview questions may not have a stable relationship to actual behaviour in naturally occurring situations (Silverman, 2001).

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