

Original Article

Market orientation, alliance orientation, and business performance in the biotechnology industry

Grant Alexander Wilson

is a graduate student of Social and Administrative Pharmacy at the University of Saskatchewan's College of Pharmacy & Nutrition.

Jason Perepelkin

is an Assistant Professor of Social and Administrative Pharmacy at the University of Saskatchewan's College of Pharmacy & Nutrition and an Associate Member of the University of Saskatchewan's Edwards School of Business.

David Di Zhang

is an Associate Professor of Marketing at the University of Saskatchewan's Edwards School of Business.

Marc-Antoine Vachon

is Professor of Marketing at the Université du Québec à Montréal.

ABSTRACT

The purpose of this study was to test the unexplored relationship between market orientation (MO), alliance orientation (AO), and business performance (PERF) in the medical/healthcare subsector of the Canadian biotechnology industry. The study surveyed Canadian biotechnology executives via mail and web-based questionnaires. It was found that the relationship between MO and PERF was positive and significant and the relationship between AO and PERF was positive and significant. It was also found that the relationship between MO and AO was positive and significant, supporting the existence of a mediation relationship. Specifically, MO's influence on PERF was found to be fully mediated by AO. This suggests that Canadian medical/healthcare biotechnology companies that were highly market-oriented were also highly alliance-oriented, and highly alliance-oriented companies were top performing companies. This study outlines the apparent sequential relationship between market-oriented behavioural commitments, alliance-oriented activities, and business performance outcomes among Canadian biotechnology companies. Furthermore, it has business development and the commercialization process implications for biotechnology managers.

Journal of Commercial Biotechnology (2014) 20(2), 32–40. doi: 10.5912/jcb645

Keywords: market orientation; alliance orientation; business performance; management; marketing

INTRODUCTION

CANADA IS A leader in biotechnology, ranking in the top five countries globally.¹⁻³ The largest subsector of the global biotechnology market is medical/healthcare, accounting for more than 67 per cent of total market value.⁴ In the biotechnology market,

effectiveness is predicated on having a strong and complete management team with competencies in all functional areas including marketing.⁵ Costa, Fontes, and Heitor state that marketing is an imperative managerial competency for successful biotechnology commercialization.⁶ Additionally, biotechnology ventures with high market knowledge are more likely to be acquisition candidates, obtain licensing deals, and accumulate capital infusions.⁷ Top managers of biotechnology companies identified having a focus in marketing strategy and the establishment of strategic alliances as critical industry success factors.⁸ There is a strong demand for biotechnology managers and entrepreneurs with marketing and

Correspondence:

Jason Perepelkin, University of Saskatchewan, Canada.

Email: jason.perepelkin@usask.ca

alliance-building competencies, as these traits enable organizational success.⁹ Due to the biotechnology industry's competitive intensity with regard to the attainment of capital and survival, managers need to be successful in identifying target markets and sharing knowledge with strategic alliance partners, as these competencies have been proven to perpetuate organizational success.¹⁰

Although strategic marketing capabilities are said to be an imperative in the commercialization process, the body of research related to marketing in the biotechnology industry is limited. It is widely accepted that MO is fundamental to the marketing concept and measures an organization's commitment to marketing and marketing strategy.¹¹⁻²¹ Narver and Slater²⁰ theorize that MO is a construct comprised of behavioural components including customer orientation, competitor orientation, and interfunctional coordination. "The theory of market orientation suggests that the three behavioral components are equally important" in determining an organization's commitment to marketing and marketing strategy (p26).²⁰

Strategic alliances are inter-organizational agreements aimed at collectively achieving individual organizational goals and gaining competitive advantages.²²⁻²⁴ In the biotechnology industry, strategic alliances are highly prevalent, as these cooperative efforts enable global expansion and minimize risk for alliance partners.^{25,26}

Strategic alliances in the North American biotechnology industry have been extensively studied in academic research.²⁷⁻³⁴ AO is a construct designed to comprehensively measure strategic alliance practices, including the employment of alliance strategies in organizations. More specifically, it measures a company's ability to scan for new alliance partners, coordinate alliance strategies, and learn from alliance experiences.³⁵

The purpose of this study was to examine the influence of MO and AO on business performance in the medical/healthcare subsector of the Canadian biotechnology industry.

LITERATURE REVIEW

The MO and performance relationship has been studied across various industries (biotechnology, construction/surveyor, exporters, forestry, hotel, internet advertisers, manufacturing, mass-merchandisers, multi-industry, and services) and in many countries (Australia, Canada, China, Ghana, India, Israel, Saudi Arabia, United Kingdom, and United States).^{11,12,15,17,20,21,36,37-50}

MO has been repeatedly shown to have a positive, and direct or moderating role in its relationship with performance in diverse settings^{11,12,15,17,20,21,36-39,41-47,49-51} Cano,

Carrillat, and Jaramillo⁵² and Kirca, Jayachandran, and Bearden,⁵³ provide evidence for the robustness of MO's influence on performance. The majority of studies used data from the manufacturing industry or a multitude of sectors,^{39,54} while only a small number of studies have explored MO and performance in the biotechnology industry.^{12,55,56}

Appiah-Adu and Ranchhod¹² employed the Narver and Slater²⁰ instrument to measure MO and performance among UK biotechnology companies. Appiah-Adu and Ranchhod¹² hypothesized that MO would be positively related to new product success, growth in market share, profit margins, and overall performance. Their findings supported three of four hypotheses, specifically MO's positive relationship with growth in market share, profit margins, and overall performance.¹² No statistically significant relationship was found between MO and new product success.¹² Appiah-Adu and Ranchhod¹² concluded that the unsupported hypothesis was a result of the peculiarities of the biotechnology industry.

De Luca, Verona, and Vicari⁵⁵ measured MO and performance in the Italian biotechnology industry. De Luca, Verona, and Vicari⁵⁵ hypothesized that customer orientation, competitor orientation, and interfunctional coordination would be positively related to their newly developed performance construct. Results supported their third hypothesis, indicating interfunctional coordination was positively and directly related to performance.⁵⁵ It was found that customer orientation and competitor orientation were not positively and directly related to performance, leading to the rejection of the first and second hypotheses.

Renko, Carsrud, and Brannback⁵⁶ explored the relationship between MO and performance among US and Scandinavian biotechnology companies. Overall, MO was found to be an antecedent to capital invested in biotechnology companies, ultimately supporting their hypothesis. However, when examined separately, the significance of the MO and performance relationship was only present among Scandinavian companies. This suggests that differences, related to the strength of the relationship between MO and performance, may exist across various national borders.

Hypothesis 1: Market orientation will have positive effect on business performance in the medical/healthcare subsector of the Canadian biotechnology industry

Strategic alliances in the North American biotechnology industry have been extensively studied in academic research.²⁷⁻³⁴ Furthermore, Baum, Calabrese, and Silverman,²⁷ Baum and Silverman,²⁸ and Silverman and Baum³² have examined the role of strategic alliances in all subsectors of the Canadian biotechnology industry.

Baum, Calabrese, and Silverman²⁷ found that new biotechnology companies' performance increased with the size and efficiency of the alliance networks.²⁷ Particularly, biotechnology companies that obtained early alliances with pharmaceutical companies experienced more patenting, a proliferation of revenue, an increase in the number of research and development (R&D) and non-R&D employees, and growth in R&D spending.²⁷ Baum and Silverman²⁸ investigated differing types of strategic alliances and their relationship with financing and overall performance in the Canadian biotechnology industry.

Baum and Silverman²⁸ found that new biotechnology ventures financially benefited most from downstream (partnerships with firms closer to the market) and horizontal (partnerships or agreements with rival biotechnology companies) alliances as opposed to upstream (agreements between biotechnology companies and universities, research institutes, government labs, hospitals, or industry associations) alliances. Baum and Silverman²⁸ suggest that biotechnology companies with alliances closer to the market (downstream or horizontal) raise more capital and perform well because it demonstrates legitimacy and commercial viability to venture capitalists.

In their study of Canadian biotechnology firms, Silverman and Baum³² found that horizontal alliances, particularly those with rivaled biotechnology firms, can impede exit rates and success. Specifically, forming horizontal alliances with rivaled companies that have greater access to the market and have more efficient networks can have negative implications for the partnering firm.³²

In various settings involving biotechnology companies, individual strategic alliance elements (e.g. alliance size) have been empirically shown to have positive and direct relationships with performance.^{27-30,33}

There is collective evidence showcasing how effective strategic alliance management is an antecedent to performance, yet no known study has measured it comprehensively and examined its effect on business performance in the biotechnology industry.^{27-30,33} Therefore, the use of the Kandermir, Yaprak, and Cavusgil's³⁵ AO instrument for this study was appropriate, as it was designed to comprehensively measure a company's commitment to strategic alliance management. The prior review of literature regarding strategic alliances and performance led to the formulation of the second hypothesis.

Hypothesis 2: Alliance orientation will have a positive effect on business performance in the medical/healthcare subsector of the Canadian biotechnology industry

Marketing and strategic alliance management competencies have been cited as biotechnology industry success factors.^{8,9} MO has been shown to increase the likelihood of commercial success in the biotechnology industry^{12,55,56} and effective strategic alliance management has been proven to increase biotechnology companies' performance.^{27-30,33} Therefore, if biotechnology companies' marketing (measured by MO) and strategic alliance management competencies (measured by AO) are strong and positive, performance is also likely to be favourable. Empirically, MO and other constructs (e.g. organizational entrepreneurship, corporate entrepreneurship, organizational flexibility, export market knowledge, quality and service, cultural affinity, and channel support) have been identified as unique and additive predictors of performance.⁵⁷⁻⁵⁹ Combining MO and AO to examine their additive effect on business performance is novel, as it is presumably an unstudied research area. The third hypothesis was developed based on evidence highlighting the importance of MO and strategic alliance management in the biotechnology industry, as well as findings from studies examining the additive effects of MO and other constructs with performance.

Hypothesis 3: Market and alliance orientation will have a positive and additive effect on business performance

METHODS

DATA SOURCE

A questionnaire was mailed to 453 Canadian medical/healthcare biotechnology companies. In order to ensure the inclusion of the 115 medical/healthcare biotechnology companies located in the Province of Quebec, with the cooperation of the Université du Québec à Montréal (UQAM), the original questionnaire was translated from English to French. A web-based option was provided as an additional completion option. Senior executives of Canadian biotechnology companies were selected as key informants due to their comprehensive knowledge of marketing, alliance strategy, business performance, and an overall understanding of their companies. Biotechnology executives (CEOs, Presidents, Vice Presidents, or Managing Directors) were identified using the Canadian Life Sciences Database and Industry Canada's Company Database.

Data collection began in May and ended in August of 2012. At the end of data collection a total of 87 responses and 53 return-to-sender packages were received. Six of the 87 responses explicitly stated that the focus of the biotechnology company was not, nor did it have the potential to become, medical/healthcare focused. These

six were then removed, reducing the responses and sample size to 81 and 447 respectively. Upon receiving the return-to-sender packages, online searches were conducted in order to determine the status of the companies. From the searches it was found that the companies had merged, been acquired, filed for bankruptcy, suspended trading, moved, or dissolved. These 53 companies were subsequently removed from the sample, further reducing its size to 394. Therefore, the response rate of the project was 20.6% (81/394). Comparatively, the number of responses received was favourable to similar studies of MO in the biotechnology industry.^{12,55,56} Specifically, Appiah-Adu and Ranchhod,¹² De Luca, Verona, and Vicari,⁵⁵ and Renko, Carsrud, and Brannback⁵⁶ obtained 62 (58.49%), 50 (30.67%), and 85 (44.27%) responses, respectively.

According to Armstrong and Overton,⁶⁰ subjects that respond later, as opposed to earlier, more closely resemble non-responders. Therefore, in the absence of non-responder questionnaires, key constructs can be compared among early and late responses to determine the existence of a nonresponse bias.⁶⁰ Leveraging the works of Armstrong and Overton,⁶⁰ independent sample t-tests were conducted to compare the group of companies classified as early responders and the group of companies classified as late responders, based on their group mean scores of MO, AO, and PERF. No statistically significant differences were found in the analyses, suggesting that early and late responders did not differ. Seeing as early and late responders did not significantly differ, there was no evidence of a nonresponse bias.

CONSTRUCT MEASUREMENT

Due to its successful use in the biotechnology industry, MO was measured using Appiah-Adu and Ranchhod's¹² adapted version of the Narver and Slater²⁰ instrument. For scale size consistency, a five-point Likert scale was used to assess companies' customer orientation, competitor orientation, and interfunctional coordination. Good reliability was achieved ($\alpha = 0.876$), as described by George and Mallery.⁶¹ An un-weighted average of MO's 12 items was used as a composite index score to represent the construct in subsequent analyses.

AO was measured using Kandermir, Yaprak, and Cavusgil's³⁵ nine-item instrument. The five-point Likert scale was used to assess companies' alliance scanning, alliance coordination, and alliance learning. Excellent reliability was achieved ($\alpha = 0.919$), as described by George and Mallery.⁶¹ An un-weighted average of AO's nine items was used as a composite index score to represent the construct in subsequent analyses.

PERF was measured using an adapted and broadened version of De Luca, Verona, and Vicari's⁵⁵ R&D Effectiveness instrument. The five-point Likert scale was used to assess companies' ability to generate new products, file or obtain patents, produce scientific output, recruit new talent, demonstrate technological leadership, attain new capital, and build partnerships. Good reliability was achieved ($\alpha = 0.844$), as described by George and Mallery.⁶¹ An un-weighted average of PERF's eight items was used as a composite index score to represent the construct in subsequent analyses.

DISCRIMINANT VALIDITY

Discriminant validity between MO, AO, and PERF was tested using composite index scores. Table 1 shows the correlations between MO, AO, and PERF group mean scores. The Pearson correlation coefficient between MO and AO was 0.470, the standard error was 0.098, and the 90 percent confidence interval was $0.296 \leq r \leq 0.622$. The Pearson correlation coefficient between MO and PERF was 0.303, the standard error was 0.118, and the 90 percent confidence interval was $0.133 \leq r \leq 0.525$. The Pearson correlation coefficient was 0.668, the standard error was 0.094, and the 90% confidence interval was $0.581 \leq r \leq 0.892$. These confidence intervals did not contain the number one, suggesting that acceptable discriminant validity between the group means was achieved.⁶²

RESULTS

Hypothesis 1 predicted that the relationship between MO and PERF would be positive and statistically significant. The result from the first regression analyses is presented in Table 2. Findings showed that MO had a positive and statistically significant effect on PERF, thus supporting H1. According to Erdfelder and Buchner's⁶³ post hoc power analysis, with an effect size of $f^2 = 0.101$,

Table 1: Correlation Matrix

		MO	AO	PERF
MO	Pearson Correlation Sig. (2-tailed)	1		
AO	Pearson Correlation Sig. (2-tailed)	0.470 0.000	1	
PERF	Pearson Correlation Sig. (2-tailed)	0.303 0.007	0.668 0.000	1

Listwise $N=79$

Table 2: MO and PERF Regression Analysis

IV	DV	R ²	Beta	t-value	Sig.
MO	PERF	0.092	0.329	2.791	0.007

Table 3: AO and PERF Regression Analysis

IV	DV	R ²	Beta	t-value	Sig.
MO	PERF	0.446	0.737	7.877	0.000

an error probability of $\alpha = 0.05$, one predictor variable (MO), and a total sample size of 79, achieved power ($1-\beta$) was 0.80, meeting the minimum power requirement ($1-\beta = 0.80$), as suggested by Cohen.⁶⁴

Hypothesis 2 predicted that the relationship between AO and PERF would be positive and statistically significant. The result from the second regression analyses is presented in Table 3. Findings showed that AO had a positive and statistically significant effect on PERF, thus supporting H2. According to Erdfelder and Buchner's⁶³ post hoc power analysis, with an effect size of $f^2 = 0.805$, an error probability of $\alpha = 0.05$, one predictor variable (AO), and a total sample size of 79, achieved power ($1-\beta$) was 1.00, exceeding the minimum power requirement ($1-\beta = 0.80$) as suggested by Cohen.⁶⁴

Hypothesis 3 predicted that the MO and AO would have a positive and statistically significant additive effect on PERF. The result from the third regression analyses is presented in Table 4. Findings showed that AO had a positive and statistically significant effect on PERF and MO had a non-significant effect on PERF, thus only partially supporting for H3. According to Erdfelder and Buchner's⁶³ post hoc power analysis, with an effect size of $f^2 = 0.805$, an error probability of $\alpha = 0.05$, two predictor variables (MO and AO), and a total sample size of 79 achieved power ($1-\beta$) was 1.00, exceeding the minimum power requirement ($1-\beta = 0.80$) as suggested by Cohen.⁶⁴

Originally, MO had a significant influence of PERF as the sole predictor in the model, but its influence became non-significant as AO entered the model. This phenomenon resembles the mediation relationship described by Baron and Kenny.⁶⁵ Accordingly, a fourth regression analysis was performed using the insignificant predictor (MO) as the independent variable and the significant predictor (AO) as the dependent variable. The result of the fourth regression analysis is presented in Table 5. Findings showed that MO had a positive and statistically significant effect on AO, thus supporting the existence of a mediation relationship.

Table 4: MO, AO, and PERF Regression Analysis

IV	DV	R ²	Beta	t-value	Sig.
MO AO	PERF	0.446	-0.015 0.744	-0.141 6.976	0.888 0.000

Table 5: MO and AO Regression Analysis

IV	DV	R ²	Beta	t-value	Sig.
MO	AO	0.220	0.459	4.690	0.000

DISCUSSION

The finding from the first hypothesis confirmed that Canadian medical/healthcare biotechnology companies with high MO scores outperformed companies with lower scores. The finding from the second hypothesis confirmed that Canadian medical/healthcare biotechnology companies with high AO scores outperformed companies with lower scores. The third hypothesis envisaged that MO and AO would have a positive and significant additive effect on business performance. The results showed that AO had a positive and statistically significant effect, but MO had a non-significant effect, on PERF, thus only partially supporting H3. A post-hoc mediation analysis revealed that the effect of MO on PERF is fully mediated through AO. The mediation relationship suggests that MO influences AO which in turn influences PERF. In other words, market-oriented biotech companies are better at managing strategic alliances, of which leads to having better performances.

"Market orientation is the organization culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuous superior performance for the business" (p21).²⁰ MO is an organizational culture that encourages customer-oriented, competitor-oriented, and interfunctionally-coordinated behaviours. AO is a comprised of three organizational capabilities including alliance scanning, alliance coordination, and alliance learning.³⁵ "Alliance orientation will be strong when a firm possesses higher degrees of each of these capabilities and is able to skillfully configure and deploy them" (p326).³⁵ In the case of Canadian medical/healthcare biotechnology companies, perhaps MO is the foundation and AO is the vehicle for increasing PERF. Consequently, companies that encourage organizational behaviours including customer orientation, competitor orientation, and interfunctional coordination may be better equipped to engage in alliance scanning, alliance coordination, and alliance learning activities. Ultimately, it is

the successful execution of these alliance activities that appears to increase business performance.

The Canadian medical/healthcare biotechnology industry has embraced Narver and Slater's²⁰ market-oriented organizational culture, as companies in the industry understand its target markets and customers, recognize its competitors' strengths and weaknesses, and disseminate knowledge throughout its departments. Having this market-oriented organizational culture is necessary for, but not directly related to, performance. Canadian medical/healthcare companies have adopted Kandermir, Yaprak, and Cavusgil's³⁵ alliance-oriented organizational capabilities, as companies actively scan for new alliance partners, effectively manage existing alliances, and learn from its partners. The alliance management organizational capabilities act as catalyst that enables the realization of the full benefits of a market-oriented organizational culture.

In summary, a sequential relationship exists between MO, AO, and PERF, as a business' philosophy needs to be established prior to its undertaking of activities, and the execution of those practices, grounded in the organizational philosophy, perpetuates business performance.

LIMITATIONS

The first limitation of this study was the response rate. Although this study compared favourably to similar studies in terms of the number of responses received ($N = 81$), the response rate was comparatively lower (20.6%). The timing of the study may have negatively impacted the response rate. Specifically, data collection was conducted over the summer months, beginning in late May and ending in late August. It is possible that some executives were on holiday during the time of data collection. Another limitation of this study is the single-respondent approach, as one respondent per company answered questions related to marketing, alliance management, and performance. The final limitation of the study is the scope and nature of the investigation. This study investigated the importance of marketing and strategic alliances in determining business performance, a topic that was salient to the researcher. The hypothesized antecedents were generated from literature and guided by the researcher's knowledge and interests.

IMPLICATIONS AND CONCLUSION

Empirical data from this study lends support for the importance of market and alliance orientation in determining Canadian medical/healthcare biotechnology companies' performance. The findings from this study

have several implications for biotechnology entrepreneurs and managers. First, the results provide evidence that behavioural orientations toward customers, competitors, and business units are the foundation needed to increase business performance. The findings also indicate that managers should pay particular attention to alliance scanning, coordinating, and learning, as these activities enable business performance. Third, managers should understand the sequential relationship between the market-oriented behavioural commitments, alliance-oriented activities, and business performance outcomes, as it can aid in business development. For instance, the sequential relationship between these behaviours, activities, and outcomes can act as a theoretical pathway to increase performance. Companies that were highly market-oriented were also highly alliance-oriented, and highly alliance-oriented companies were top performing companies. The apparent sequential relationship is not the only commercialization pathway, nor does it explain all of the behaviours and activities needed to be commercially successful, but it is important for managers and entrepreneurs to be mindful of its significance.

These findings produced several contributions to marketing and management academic research. First, Narver and Slater's²⁰ MO instrument proved to be successful with an unstudied population. The instrument's success in the Canadian medical/healthcare biotechnology industry contributed to a large body of research that confirms MO positively influences performance. Second, this was the first known study to comprehensively measure strategic alliance management activities in the biotechnology industry. This study employed the underutilized Kandermir, Yaprak, and Cavusgil's³⁵ AO instrument, thereby expanding AO research and the use of the instrument. Moreover, the findings contribute to a large body of research that suggests strategic alliance management positively influences biotechnology performance. Third, this study goes beyond confirming MO and AO's importance in the relationship with PERF, as the existence of a mediation relationship was tested and confirmed. Fourth, and perhaps the most significant contribution was the development and successful use of the PERF instrument. The PERF instrument proved to be an effective instrument when measuring biotechnology business performance. Finally, the findings expand the scope of biotechnology marketing and strategic alliance management research. It may be fruitful to explore MO in other biotechnology subsectors, expand the use of the AO instrument in other industries and cultural contexts, utilize the newly developed and successful PERF instrument to measure biotechnology performance in other subsectors and cultural contexts, and investigate the influence of other possible antecedents to biotechnology business performance.

REFERENCES

1. Conference Board of Canada. (2005) Biotechnology in Canada - A Technology Platform for Growth, <http://www.conferenceboard.ca/documents.aspx?did=1452>, accessed 10 August 2011.
2. Government of Canada. (2011) Biotechnology, <http://investincanada.gc.ca/eng/industry-sectors/biotechnology.aspx>, accessed 10 August 2011.
3. Industry Canada. (2011) Life Sciences Gateway - Canada's Biotechnology Industry, http://www.ic.gc.ca/eic/site/lsg-pdsv.nsf/eng/h_hn00079.html, accessed 10 August 2011.
4. Datamonitor (2011) Industry Profile: Global Biotechnology, New York, NY.
5. Woiceshyn J. (1993) Management - Key to New Product Development in Biotechnology. *Long Range Planning* 26(3): 67-76.
6. Costa, C., Fontes, M. and Heitor, M.V. (2004) A Methodological Approach to the Marketing Process in the Biotechnology-Based Companies. *Industrial Marketing Management* 33(5): 403-418.
7. Renko, M., Carsrud, A.L. and Brannback, M. (2008) The Living Dead – Why They Turned Out That Way? Babson College Entrepreneurship Research Conference (BCERC); 2008, Babson Park, MA. *Frontiers Entrepreneurship Research*: 1-15.
8. Hourd, P.C. and Williams, D.J. (2008) Results from an Exploratory Study to Identify the Factors that Contribute to Success for UK Medical Device Small- and Medium-Sized Enterprises. *Journal of Engineering Medicine* 222(5): 717-735.
9. Yim, J.W. and Weston, R. (2007) The Characteristics of Bioentrepreneurs in the Australian Biotechnology Industry: A Pilot Study. *Journal of Management and Organization* 13(4): 383-406.
10. Terziovski, M. and Morgan, J.P. (2006) Management Practices and Strategies to Accelerate the Innovation Cycle in the Biotechnology Industry. *Technovation* 26(5/6): 545-552.
11. Appiah-Adu, K. (1998) Market Orientation and Performance: Empirical Tests in A Transition Economy. *Journal of Strategic Marketing* 6(1): 25-45.
12. Appiah-Adu, K. and Ranchhod, A. (1998) Market Orientation and Performance in the Biotechnology Industry: An Exploratory Empirical Analysis. *Technology Analysis & Strategic Management* 10(2): 197-210.
13. Drucker, P.F. (1954) *The Practice of Management*. New York, NY: Perennial Library.
14. Farrell, M.A. and Oczkowski, E. (1997) An Analysis of the MKTOR and MARKOR Measures of Market Orientation: An Australian Perspective. *Marketing Bulletin* 8(3): 30-40.
15. Greenley, G.E. (1995) Market Orientation and Company Performance: Empirical Evidence From UK Companies. *British Journal of Management* 6(1): 1-13.
16. Han, J.K., Kim, N. and Srivastava, R.K. (1998) Market Orientation and Organizational Performance: Is Innovation A Missing Link? *Journal of Marketing* 62(4): 30-45.
17. Harris, L.C. (2001) Market Orientation and Performance: Objective and Subjective Empirical Evidence From UK Companies. *Journal of Management Studies* 38(1): 17-43.
18. Kohli, A.K. and Jaworski, B.J. (1990) Market Orientation: The Construct, Research Propositions, and Managerial Implications. *Journal of Marketing* 54(2): 1-18.
19. McCarty, E.J. (1960) *Basic Marketing: A Managerial Approach*. Homewood, IL: Richard D. Irwin.
20. Narver, J.C. and Slater, S.F. (1990) The Effect of a Market Orientation on Business Profitability. *Journal of Marketing* 54(4): 20-35.
21. Subramanian, R. and Gopalakrishna, P. (2001) The Market Orientation-Performance Relationship in the Context of A Developing Economy An Empirical Analysis. *Journal of Business Research* 53(1): 1-13.
22. Elmuti, D., Abebe, M., and Nicolosi, M. (2005) An Overview of Strategic Alliances Between Universities and Corporations. *Journal of Workplace Learning* 17(1/2): 115-129.
23. Parkhe, A. (1993) Strategic Alliance Structuring: A Game Theoretic and Transaction Cost Examination of Interfirm Cooperation. *Academy of Management Journal* 36(4): 794-829.
24. Varadarajan, P.R. and Cunningham, M.H. (1995) Strategic Alliances: A Synthesis of Conceptual Foundations. *Journal of the Academy of Marketing Science* 23(4): 282-296.
25. Simon, F. and Kotler, S. (2003) *Building Global Biobrand: Taking Biotechnology to Market*. New York, NY: Free Press.
26. McCutchen, W.W. and Swamidass, P.M. (2004) Motivations for Strategic Alliances in the Pharmaceutical/Biotech Industry: Some New Findings. *Journal of High Technology Management Research* 15(2): 197-214.
27. Baum, J.A.C., Calabrese, T. and Silverman, B.S. (2000) Don't Go It Alone: Alliance Network Composition and Startups' Performance in Canadian Biotechnology. *Strategic Management Journal* 21(3): 267-294.
28. Baum, J.A.C. and Silverman, B.S. (2004) Picking Winners or Building Them? Alliance, Intellectual,

- and Human Capital as Selection Criteria in Venture Financing and Performance of Biotechnology Startups. *Journal of Business Venturing* 19(3): 411-436.
29. Forest, J.E. and Martin, M.J.C. (1992) Strategic Alliances Between Large and Small Research Intensive Organizations: Experiences in the Biotechnology Industry. *R&D Management* 22(1): 41-54.
 30. George, G., Zahra, S.A., Wheatley, K.K. and Khan, R. (2001) The Effects of Alliance Portfolio Characteristics and Absorptive Capacity on Performance A Study of Biotechnology Firms. *Journal of High Technology Management Research* 12(2): 205-226.
 31. George, G., Zahra, S.A. and Wood, D.R. (2002) The Effects of Business-University Alliances on Innovative Output and Financial Performance: A Study of Publicly Traded Biotechnology Companies. *Journal of Business Venturing* 17(6): 577-609.
 32. Silverman, B.S. and Baum, J.A.C. (2002) Alliance-Based Competitive Dynamics. *Academy of Management Journal* 45(4): 791-806.
 33. Sarkar, M.B., Echambadi, R. and Harrison, J.S. (2001) Alliance Entrepreneurship and Firm Market Performance. *Strategic Management Journal* 22(6/7): 701-711.
 34. Standing, S., Standing, C. and Lin, C. (2008) A Framework for Managing Knowledge in Strategic Alliances in the Biotechnology Sector. *Systems Research in Behavioral Science* 25(6): 783-796.
 35. Kandermir, D., Yaprak, A. and Cavusgil, S.T. (2006) Alliance Orientation: Conceptualization, Measurement, and Impact on Market Performance. *Journal of the Academy of Marketing Science* 34(3): 324-340.
 36. Bhuian, S.N. (1998) An Empirical Examination of Market Orientation in Saudi Arabian Manufacturing Companies. *Journal of Business Research* 43(1): 13-25.
 37. Cadogan, J.W., Diamantopoulos, A. and Siguaw, J.A. (2002) Export Market-Oriented Activities: Their Antecedents and Performance Consequences. *Journal of International Business Studies* 33(3): 615-626.
 38. Dawes, J. (2000) Market Orientation and Company Profitability: Further Evidence Incorporating Longitudinal Data. *Australian Journal of Management* 25(2): 173-199.
 39. Deng, S. and Dart, J. (1994) Measuring Marketing Orientation: A Multi-Factor, Multi-Item Approach. *Journal of Marketing Management* 10(8): 725-742.
 40. Diamantopoulos, A. and Hart, S. (1993) Linking Market Orientation and Company Performance: Preliminary Evidence on Jaworski and Kohli's Framework. *Journal of Strategic Marketing* 1(2): 93-121.
 41. Jaworski, B.J. and Kohli, A.K. (1993) Market Orientation: Antecedents and Consequences. *Journal of Marketing* 57(3): 53-70.
 42. Kara, A., Spillan, J.E. and DeShields, O. (2005) The Effect of a Market Orientation on Business Performance: A Study of Small-Sized Service Retailers Using MARKOR Scale. *Journal of Small Business Management* 43(2): 105-118.
 43. Matsuno, K. and Mentzer, J.T. (2000) The Effects of Strategy Type on the Market Orientation-Performance Relationship. *Journal of Marketing* 64(4): 1-16.
 44. Noble, C.H., Sinha, R.K. and Kumar, A. (2002) Market Orientation and Alternative Strategic Orientations: A Longitudinal Assessment of Performance Implications. *Journal of Marketing* 66(4): 25-39.
 45. Perry, M.L. and Shao, T. (2002) Market Orientation and Incumbent Performance in Dynamic Market. *European Journal of Marketing* 36(9/10):1140-1153.
 46. Pulendran, S., Speed, R. and Widing, R.E. (2000) The Antecedents and Consequences of Market Orientation in Australia. *Australian Journal of Management* 25(2): 119-143.
 47. Rose, G.M. and Shoham, A. (2002) Export Performance and Market Orientation: Establishing an Empirical Link. *Journal of Business Research* 55(3): 217-225.
 48. Sargeant, A. and Mohamad, M. (1999) Business Performance in the UK Hotel Sector – Does it Pay to be Market Oriented. *The Services Industries Journal* 19(3):42-59.
 49. Slater, S.F. and Narver, J.C. (1994) Does Competitive Environment Moderate the Market Orientation – Performance Relationship? *Journal of Marketing* 58(1): 46-55.
 50. Tay, L. and Morgan, N.A. (2002) Antecedents and Consequences of Market Orientation in Chartered Surveying Firms. *Construction Management and Economics* 20(4): 331-341.
 51. Cadogan, J.W., Cui, C.C. and Li, E.K.Y. (2003) Export Market-Oriented Behavior and Export Performance: The Moderating Roles of Competitive Intensity and Technological Turbulence. *International Marketing Review* 20(5): 493-513.
 52. Cano, C.R., Carrillat, F.A. and Jaramillo, F. (2004) A Meta-Analysis of the Relationship Between Market Orientation and Business Performance: Evidence from Five Continents. *International Journal of Research in Marketing* 21(2): 179-200.
 53. Kirca, A. H., Jayachandran, S. and Bearden, W.O. (2005) Market Orientation: A Meta-Analytic Review

- and Assessment of its Antecedents and Impact on Performance. *Journal of Marketing* 69(2): 24-41.
54. Heslop L. and Qu, P. (2007) Market Orientation: Its Measurement and Role in Canadian Manufacturing and Telecommunication Firms, Proceedings of ASAC 2007; 2-5 June, Ottawa, ON: ASAC pp.59-75.
 55. De Luca, L.M., Verona, G. and Vicari, S. (2010) Market Orientation and R&D Effectiveness in High-Technology Firms: An Empirical Investigation in the Biotechnology Industry. *Journal of Product Innovation Management* 27(3): 299-320.
 56. Renko, M., Carsrud, A.L. and Brannback, M. (2009) The Effect of Market Orientation, Entrepreneurial Orientation, and Technological Capability on Innovativeness: A Study of Young Biotechnology Ventures in the United States and Scandinavia. *Journal of Small Business Management* 7(3): 331-369.
 57. Bhuiyan, S.N. and Habib, M. (2004) The Relationship Between Entrepreneurship, Market Orientation and Performance: A Test in Saudi Arabia. *Journal of Transnational Management* 10(1): 79-98.
 58. Barrett, H. and Weinstein, A. (1998) The Effect of Market Orientation and Organizational Flexibility on Corporate Entrepreneurship. *Entrepreneurship: Theory and Practice* 23(1): 57-70.
 59. Thirkell, P.C. and Dau, R. (1998) Export Performance: Success Determinants for New Zealand Manufacturing Exporters. *European Journal of Marketing* 32(9): 813-829.
 60. Armstrong, J.S. and Overton, T.S. (1977) Estimating Nonresponse Bias in Mail Surveys. *Journal of Marketing* 14(3): 396-402.
 61. George, D. and Mallery, P. (2009) *SPSS for Windows Step by Step: A Simple Guide and Reference*, 17.0 Update. Boston, MA: Allyn & Bacon.
 62. Kline, R.B. (2005) *Principles and Practices of Structural Equation Modeling*. New York, NY: Guilford Publications.
 63. Erdfelder, E., Faul, F. and Buchner, A. (1996) GPOWER: A General Power Analysis Program. *Behavior Research Methods, Instruments, & Computers* 28(1): 1-11.
 64. Cohen, J. (1988) *Statistical Power Analysis for the Behavioral Sciences*. 2nd Ed. New York, NY: Academic Press.
 65. Baron, R.M. and Kenny, D.A. (1986) The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology* 51(6): 1173-1182.