Academic program portfolio model for universities: Guiding strategic decisions and resource allocations

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The Academic Program Portfolio Model (APPM) described in this paper is a product portfolio strategic analysis tool customized for universities. It is adapted from the General Electric McKinsey Product Portfolio Model used widely in business. The APPM's two dimensions, attractiveness of the academic program's marketplace and capabilities of the program and institution, summarize external conditions beyond the control of the academic program and internal factors to the program that directly influence its long-term success, respectively. The APPM's systematic analysis guides academic administrators in the determination of strategic direction, resource allocation, and performance expectations for each academic program.

Keywords: Product portfolio model, strategic planning, strategic analysis, higher education, university administration, resource allocation

INTRODUCTION

University administrators face the same strategic planning challenges as the top managers in a business organization. Administrators, like corporate managers, are responsible for the allocation and alignment of limited resources so that the university serves its mission and meets its objectives. It is strategic analysis that guides this resource allocation and alignment so that the institution positions itself to leverage its assets, minimize its risks, and satisfy the expectations of its varied stakeholders. Consider just a few stakeholder examples: students expect specific majors and courses, donors expect progressive and exciting initiatives, faculty members expect financial compensation and individualized support, governing boards expect assessment, improvement, and fiscal responsibility.

The administrator's path to success, to integrating all of these issues and more, depends on the strategies employed and the allocation of the institution's resources. Units, departments, and/or academic majors targeted for growth receive additional resources, while others receive funds sufficient to maintain the status quo, and others sacrifice resources, or disappear. Broadly speaking, these strategies are categorized as growth, maintenance, and divestment. By using information, data, and analysis as inputs, an appropriate strategy can be determined.

This paper describes the Academic Program Portfolio Model (APPM) for strategic analysis of the academic programs offered by a university. The APPM is adapted from traditional product portfolio models in widespread use by business organizations. Two dimensions, program marketplace attractiveness and program and institution capabilities, define the APPM and incorporate characteristics of the academic program, the academic institution, and the marketplace in which the program operates. The results of the APPM analysis guide academic administrators with their strategic choices and resource allocations. This paper also presents initial ideas regarding the use of an academic program review to provide the information and data required for strategic analysis using the APPM.

IMPORTANCE OF STRATEGIC ANALYSIS TO UNIVERSITIES

Universities are operating in a turbulent environment characterized by difficult economic conditions, instability in financial markets, decreased federal and state funding, constraints on employment opportunities, and fluctuating student demand (Fathi, 2009, Peterson, 1997, Szekeres, 2010, Vitullo, 2010). Faced with changes in the environment that are completely outside the control of the institution (macro trends), university administrators must rely on strategic analysis to guide the allocation of scarce and valuable resources. Through strategic resource allocation, university administrators are able to sustain a clear and meaningful differential advantage relative to competition and to increase the likelihood of meeting long-term organizational objectives consistent with the institution's mission.

Value of Models for Strategic Analysis

Examples from the literature demonstrate the value of applying and adapting strategic models to university planning processes. Some work, such as the Dolence and Norris (1994) model that follows and Pineno's (2008) adaption of the Balanced Scorecard, addresses the entire scope of strategic planning processes. Others speak to the importance of strategic planning in higher education within a specific context. The work of Kotler and Fox (1985) addresses the

development of a strategic planning tool that focuses on a specific element of strategic analysis, a model for product portfolio analysis.

In order to facilitate strategic decisions, Dolence and Norris (1994) developed the Strategic Decision Engine. This model provides an overview of a strategic planning process customized for universities. It incorporates the analysis of external factors beyond the control of the institution, such as macro trends and competitors, and internal factors under the institution's control, including strengths and weaknesses, organizational performance and design, and organization resource allocation. This model provides administrators a technique to assess the cross-impact of internal and external inputs in strategic analysis, and to apply the analysis at all organizational levels, from the institution in its entirety to individual departments.

Navarro and Gallardo (2003) offer another strategic model to provide guidance for a process of change. Their work underscores the importance of the strategic management of universities and proposes a model of strategic change that integrates the complexities of the environment in which universities operate and the dynamics of organizational capabilities.

Others acknowledge the importance of strategic analysis to the success of academic institutions across various contexts. Rowley, Lujan, and Dolence (1997) and Rowley and Sherman (2001, 2004) offer managerial perspectives emphasizing the importance of strategic analysis in higher education and the need to customize analytical techniques and planning processes for the unique environment and political character of universities. Shirley (2006) advances an overview of strategic planning that analyzes institutional mission, strengths, weaknesses, opportunities, and threats to determine strategic action. Murphy and Stamtakos (1989) focus on planning and analysis to guide university-wide decision-making. Hunt (1997) also advances an overview of strategic planning for higher education while concentrating on the unique complexities of strategic analysis for private universities. Machado and Taylor (2010) focus on the importance of strategic planning and analysis given the complexities of European higher education. Regardless of context, strategic analysis is a process necessary for "…charting university futures and organizing resources to accomplish those futures" (Murphy and Stamatakos, 1989).

Kotler and Fox (1985) examine the relationship of the institution with its markets and stakeholders and the contribution of strategic analysis of the marketplace to the institution's strategic plan. Their approach underscores the importance of strategic analyses to understand and manage student, faculty, and donor markets. Similar to the approaches previously mentioned, Kotler and Fox include analyses to develop understanding of external factors, such as macro trends, competition, and consumers of higher education, and of internal factors, such as institutional resources and capabilities, academic programs, faculty and other personnel, and intellectual capital.

Sources of Information and Data for Strategic Analysis

University faculty and administrators already engage in a multitude of review and assessment activities. An institution's mission and objectives ought to be clearly articulated, the budgeting process well established, accreditation standards and outcomes assessment thoroughly integrated, and customary processes for program development, review, and change firmly entrenched (Rowley, Lujan, and Dolence, 1997). It is to the institution's advantage to use the information, data, and results of these ongoing review and assessment activities in strategic analyses.

To leverage this advantage, administrators must prepare ahead. What specific budget information is required in a strategic analysis? Will an accreditation self-study or a program review include an analysis of macro trends? To assure this, the institution must anticipate the data and information requirements of the models used for its strategic analyses. In this way, administrators anticipate specific data and information needs and design ongoing processes to deliver exactly that information.

An academic program review, for example, designed to aggregate and assess information descriptive of an academic program's situation and status, focuses on factors internal to the program and the institution. The review includes evaluation of program objectives, accomplishments toward those objectives, quality of faculty, quality of students, and rigor of the curriculum. Though the Council of Graduate Schools suggests otherwise (2005), a program review may go on to evaluate financial resource allocations and requirements. Strategic analyses require all of this information to determine the alignment of the academic program with the mission of the institution.

The institution's allocation of financial resources, however, depends not only on internal information, but also on external factors. What macro trends effect employer interest in graduates of the program? What competing universities attract the best students and why? What drives a student to select one academic program over another? What organizations or foundations will fund the academic program? Continuing with the example of academic program reviews mentioned above, the opportunity exists for periodic and systematic reviews to answer questions such as these and to provide data and information that translates directly into models of strategic analyses. These analyses, in turn, inform the institution's allocation of resources.

Product Portfolio Models

Product portfolio models are tools for strategic analysis with a long history of use in organizational strategic planning processes. These models analyze the current and potential value of each product (or product line or strategic business unit) to the organization and provide guidance for strategic choices and resource allocations. In this section the Academic Portfolio Model, built specifically for university strategic planning, is described first. Next, two general product portfolio models are introduced, and their customization for higher education and healthcare is reviewed. Finally, a new, more robust model customized for universities is proposed.

The Academic Portfolio Model

Kotler and Fox (1985) designed a product portfolio model, the Academic Portfolio Model, applicable for the strategic analysis of a university's academic programs. This model focuses on outcomes to guide strategic decisions and resource allocations and offers insight into the application and importance of product portfolio models in the academic setting.

As discussed by Kotler and Fox:

> During decades of expansion, many institutions added courses and programs. When the financial crunch hit in the 1970s, many faced the choice of making cuts across the board or of identifying the stronger programs for full support while drawing funds away from weaker programs. This can be an exceedingly painful process, but economic realities suggest that each institution focus its financial and other resources on programs that further

its mission, build on institutional strengths, and meet the needs of identifiable target markets.

They identify three dimensions for the assessment of academic portfolio strategy: (1) the centrality of the program to the university's mission, (2) the quality of the program, and (3) the viability of the market. Centrality is the assessment of the relationship between the program and the current mission of the institution. The assessment of centrality is high when the relationship between program and mission is direct. Academic depth and rigor and the quality of the faculty, two variables assessed based on judgment, reflect program quality. Finally, present demand and forecasted future demand for the academic program determine program viability.

To illustrate, academic programs high in centrality, low in quality, and low in market viability may require an infusion of resources to build quality. Programs low in centrality, high in quality, and low in market viability may be candidates for termination. To make these determinations, university administrators must consider the entire portfolio of academic programs. While this model integrates internal and external factors important to strategic analysis, the criteria applied to the assessment of each of the three dimensions are not entirely explicit.

Customized Product Portfolio Models

The General Electric McKinsey (GE McKinsey) Product Portfolio Model and the Boston Consulting Group (BCG) Growth Share Matrix are two readily recognized models that have gained wide acceptance in business. A comprehensive discussion of both models may be found in the Harvard Business School article authored by George Yip (1984). These two models have been customized for applications beyond the traditional business setting, including attempts to adapt product portfolio models for higher education and for healthcare.

The BCG model uses market growth rate and relative market share to assess the viability of a product line or organizational unit. Newbould (1980) was one of the first to discuss the customization of the BCG's product portfolio model for universities. Newbould translated market growth rate into the growth in FTE (full-time equivalent) students in the academic field over the past five years and relative market share into the ratio of FTE students in the field at the university in question to the FTE students at the largest competing university. With this translation, the university compares academic programs to identify those requiring management and resource allocation for growth, maintenance, or possible termination. While direct in its measurement, this model fails to capture the complexities associated with the marketplace and the operations of academic programs in universities. The growth rate of an academic discipline derives from a multitude of factors beyond student demand. Growth rate may reflect government investment, industry expansion, societal demands, innovation, or scholarly/scientific breakthroughs. Relative market share may reflect specific program design features, not shifts in student demand based on competitive strategies.

Nancy Lyle (2007) described the customization of both the BCG model and the GE McKinsey model for application in the healthcare industry. She concluded that the while the BCG model is attractive, its assumptions relating market share and profitability are not necessarily true when equating service lines for the treatment of diseases to product offerings, and that the GE McKinsey model, which incorporates multiple factors and is structurally more readily adapted to different settings, is better suited for healthcare. By customizing the GE McKinsey model, Lyle developed the Triad Consulting Group (TCG) Portfolio Growth Model for applications in the

healthcare industry. With her approach, she demonstrates the value of the model to differentiate among service lines and to provide guidance for the allocation of resources to support future growth and financial performance.

While the GE McKinsey model has not yet been adapted specifically for universities, the importance of academic program portfolio analysis as articulated by Kotler and Fox and the depth and complexity of analysis offered by the GE McKinsey model as demonstrated by Lyle in the healthcare industry warrant the model's customization for higher education. The Academic Program Portfolio Model described below does exactly this.

THE ACADEMIC PROGRAM PORTFOLIO MODEL: THE GE MCKINSEY MODEL CUSTOMIZED FOR HIGHER EDUCATION

The GE McKinsey model readily lends itself to customization for higher education. Since this model is the foundation for the development of a new program portfolio model for universities, a description of the basic model precedes the presentation of the customized version.

The GE McKinsey Product Portfolio Model

The GE McKinsey Product Portfolio Model captures both external and internal factors important to strategic analysis through two dimensions: competitive capabilities and industry attractiveness. Examples of criteria typically used to define competitive capabilities (the internal factors referenced earlier) and used to define the attractiveness of the industry (the external factors), appear in Table 1(Appendix). The internal factors are relevant to the organization's ability to differentiate itself from competitors and reflect current resource allocations. External factors, by their very nature, are beyond the control of the organization, but are important in determining resource allocation.

As shown in Table 2 (Appendix), the GE McKinsey Product Portfolio Model is a nine-cell model with three scale values for each of the two dimensions. The assessment of industry attractiveness results in a highly attractive, moderately attractive, or unattractive evaluation based on judgment (qualitative evaluation) or metrics (interval data assigned to indicate the importance of each criterion and strength of the unit on each criterion). The assessment of competitive capabilities results in a strong, moderate, or weak evaluation.

The organization assesses each of its products, product lines, divisions, or strategic units along each dimension using criteria relevant to the firm and industry. This analysis results in the identification of a strategic direction and resource requirements for each offering. Table 2 displays the appropriate strategies corresponding with each pair of variables associated with industry attractiveness and competitive capabilities.

The Academic Program Portfolio Model

The customization of the GE McKinsey Product Portfolio Model is attractive for at least three reasons. First, the two dimensions measured, industry attractiveness and competitive capabilities, when altered appropriately, are relevant in the marketplace of higher education. Second, multiple criteria to assess each dimension are readily identifiable. Finally, the information and data relevant to the assessment of the criteria may be available through existing processes of review, evaluation, and assessment. As shown in Table 3 (Appendix), industry attractiveness

becomes attractiveness of the program marketplace, which defines the academic program's market for students, the market for graduates, competing programs, and other external factors influencing that marketplace. Competitive capabilities translate into program and institution capabilities, which define the critical internal characteristics influencing the academic program's ability to compete successfully in the marketplace.

Criteria important to the determination of program and institution capabilities align with those used by business organizations to assess competitive capabilities. Examples of criteria germane to universities appear in Table 4 (Appendix). Comparisons between the criteria listed in Table 1 and those appearing in Table 4 underscore the logical consistency between the two models. Instead of measuring the percentage of sales, a university measures the percentage of students selecting its degree program relative to all students in the market for that degree. Brand reputation of products and companies in industry translate into the reputation of the degree program and of the university. Product quality, production issues, and research and development become faculty qualifications and scholarship.

Table 4 also lists criteria relevant to the attractiveness of the program marketplace customized for the APPM. As previously discussed, a criterion relevant to industry attractiveness is market size, which for universities becomes potential student demand for a degree program. Similarly, annual market growth rate for an industry becomes annual growth rate of student demand for a degree program. . Student demand relates to employers' demand for graduates with a particular degree, competition includes other colleges, universities, or organizations offering the same or substitutable degree programs, and the legal and political issues are influenced by the orientation and actions of local, state, and federal governments. Accordingly, the criteria listed in Table 4 include those germane to the unique aspects of the nature of higher education.

The APPM in Table 5 (Appendix) depicts the dimensions, matrix, and strategies of the customized GE McKinsey Product Portfolio Model from Table 2. The institution's administration assesses each academic program, department, or unit along each dimension based on selected, relevant criteria. These assessment results identify the location of each academic program, department, or unit within the matrix. Those falling in the lower left are at risk and subject to divestment or reduction strategies, while those falling in the upper right are attractive and candidates for maintenance or growth strategies. The results of the analysis guide strategic direction and resource allocations consistent with marketplace opportunities, program and institution capabilities, and the institution's objectives.

The Academic Program Portfolio Model in Use

The APPM analysis gives university administrators a snapshot of the relative value of multiple academic programs based on unique program and institution capabilities and the attractiveness of the marketplace for the academic programs. Embedded in these two dimensions are the criteria reflective of the institution's mission, objectives, and strategies, the competitive environment, relevant macro trends, and the distinctive competencies of each academic program.

In order to illustrate the use of APPM analysis, consider a scenario in which a dean and provost have administrative responsibility for determining the strategic direction and the allocation of resources for all graduate programs in a College of Arts and Sciences. The locus of control for each degree resides in an academic department, with responsibility and authority for the program

in the hands of the department's faculty and its chairperson. The provost and dean, however, control the allocation of financial resources from the university's general fund.

Application of the APPM first requires the identification of criteria to assess the capabilities of each graduate program and of the institution relative to that program. In addition, it requires the identification of the criteria necessary to assess the attractiveness of each program's marketplace. For purposes of this illustration, the College of Arts and Sciences graduate programs under consideration are limited to the sciences which includes these seven majors; Chemistry, Biology, Biochemistry, Geology, Environmental Geology, Physics, and Medical Sciences. In this example, it is assumed that graduate programs in the sciences focus on attracting students from national and international markets and meeting the demand of regional employers for graduates. With this in mind, the criteria included reflect the geographic and regional orientation.

The criteria, presented in Table 6 (Appendix), reflect the judgment of the administrators and faculty engaged with the strategic planning process. The selection of criteria produces a model customized to the specific situation and conditions relevant to the academic programs under consideration.

In addition to the identification of the criteria, judgment is also used to determine the relative importance of each criterion to the overall assessment of capabilities (relative weights totaling 1.00) and to the overall assessment of marketplace attractiveness (relative weights totaling 1.00). Similarly, the value of each criterion, i.e. the strength of the academic program on each criterion, is determined using judgment (1 to 5 scales, 1 meaning weak and 5 meaning strong). The importance weights and the values for the analysis of the graduate program in Chemistry appear in Table 7 (Appendix). The value multiplied by the relative importance weight of each criterion determines the weighted score. The total of these weighted scores provides a composite measure of capabilities and attractiveness, and are the coordinates that locate the graduate program in the APPM matrix. By virtue of this calculation, these composite scores must fall between 1 and 5. The weighted and composite scores for the graduate program in Chemistry also appear in Table 7. For example, the composite program and institution capability rating is 3.25, while the rating for composite program marketplace attractiveness is 2.5.

The same systematic analyzes are done for the graduate programs in the six other science disciplines. The criteria for program capabilities and attractiveness of the program marketplace remain the same in all seven cases. The relative importance weights and values vary based on the internal and external factors unique to each of the science programs. For example, the flexibility of the faculty to vary schedules and locations may be a more important determinate of the capabilities of the graduate program in Geology than it is for the program in Chemistry. Faculty members in Geology need to have the flexibility to instruct students in the field as well as the lab. Given the close alignment of graduate programs in the sciences, the importance weights for the criteria that influence marketplace attractiveness will likely be the same in all cases. This would not be the case if the analysis included disparate graduate programs. The rate at which technology becomes obsolete, while a factor in the assessment of graduate programs in both the sciences and the social sciences, may be much more important to the determination of marketplace attractiveness for Physics than it would be for Psychology.

The value ratings vary from program to program based on a variety of reasons. Past resource allocations, the research activity of the faculty, regional trends in industry, and the strength of competition influence the capabilities and marketplace for graduate programs in the sciences differentially. The rating of each program on each criterion is a reflection of these differences.

A summary of the composite scores for each of the seven science areas calculated for the APPM analysis appears in Table 8 (Appendix). Included is the relative size of each of the science programs, stated as a percentage of the total number of graduate students in all seven academic programs. In this example, the academic program in Medical Sciences enrolls the largest number of students with 25 percent of the total.

Figure 1 (Appendix) displays the results of the analysis. The size of each circle reflects the relative size of each of the four programs. Based on these results, the assessment of the specific criteria, and the strategies customized for higher education appearing in Table 5, administrators have guidance regarding the strategic direction of each program and the appropriate allocation of resources.

The program in Chemistry operates in a moderately attractive marketplace supported by moderate program and institution capabilities and attracts 12 percent of those majoring in the sciences. A review of the assessment of the criteria indicates that employer demand for graduates over the next five years, a relatively important factor, is weak and that the reputation of the program, another important factor, needs strengthening. In this situation, a strategy that maintains and protects the Chemistry program in anticipation of future employment opportunities is appropriate. Depending on available resources, investments to develop attractive subareas of Chemistry that appeal to select student and employer market segments are reasonable. For example, assume that a large number of research hospitals and strong demand for physicians distinguishes the region. Also, assume that the capabilities of the Medical Sciences program are constrained mainly by limited capacity. A new program in medical chemistry, a subarea of Chemistry, could relieve that capacity constraint and utilize the department's faculty in ways that take advantage of the attractive marketplace for Medical Sciences.

Biochemistry may also benefit from a similar strategic realignment of resources. While this program operates in a relatively attractive marketplace, its capabilities are relatively weak. A reasonable strategy is to build on any existing program strengths by investing and/or realigning resources. In comparison, Environmental Geology is operating in a relatively attractive marketplace, and it benefits from strong program and institution capabilities. The administration should consider making resource investments designed for strategic growth while maintaining the Environmental Geology program's strengths. The program in Physics, with the attractive marketplace and relatively large number of student majors, is positioned for the strategic development of capabilities.

Even though they attract large numbers of graduate students, Geology and Biology both operate in relatively unattractive marketplaces. Without a favorable shift in employment opportunities or positive swings in macro trends, these two programs are at risk. To manage this risk, administrators may focus on redirecting student demand to other, more attractive science programs, thus freeing resources previously allocated to Geology and Biology. While using these available resources to support the growth of other science programs, efforts should be made to maintain the current capabilities of both programs. A strategy of concentrating existing capabilities in specialized areas may serve this purpose.

In the near term, this analysis suggests resource investments adequate to maintain the program in Chemistry and the development of subareas to enhance the capabilities of other programs in the sciences. In addition, it supports resources shifts from Geology and Biology to support growth in Environmental Geology, the development of capabilities in Physics, and the leveraging of any existing capabilities in Biochemistry. Finally, the analysis suggests investments

to build the program and institution capabilities in Medical Sciences and sufficient to protect total enrollments in the sciences.

Sources of Information and Data for the APPM Analysis

As mentioned earlier, requirements for assessment and evaluation inundate university faculty and administrators. Government agencies demand accountability, accrediting organizations impose standards, stakeholders exact responsibility, and potential students require data and information to facilitate their program selection. The extent to which these ongoing processes map directly into the APPM analysis influences both the efficiency of the process and the alignment of resource allocation decisions with the institution's objectives and mission.

Since this application of the APPM is program based, graduate program reviews are an ideal way to gather the necessary information and data. Graduate program reviews provide an example of how existing evaluation processes can produce a valuable assessment of the program and provide the data and information necessary to inform strategic analyses.

The graduate program review can serve a dual purpose. From the vantage point of a faculty member, it provides a formal opportunity to highlight and promote the program's successes, to assess whether or not there are sufficient resources devoted to the program, and to improve the program. From the point of view of a university administrator, it is an opportunity to assess if the program remains viable given the strategic direction of the university, and, if so, what additional resources or actions are required to improve its operations.

In practice, graduate program reviews ultimately inform the allocation of institutional resources, though incomplete information may limit the extent of that influence. In many instances, those performing the program review do not possess expertise in strategic analysis; consequently, the review performed may not address all issues adequately, and, in fact, may omit entirely the inclusion and measurement of variables that provide information and data for strategic decisions.

For this reason, it is advocated that a systems approach be used in the design of the graduate program review process. A systems approach produces a comprehensive program review that incorporates the study of the characteristics of the graduate program, its organizational structure, students and student markets, faculty and staff, and external stakeholders, such as employers, governments, and the academic discipline. These entities, and the nature of their relationships, identify both internal and external factors important to strategic analyses and map directly into the APPM. Figure 2 (Appendix) provides a schematic to be used in a systems approach that provides assistance to faculty and administrators responsible for graduate program review. An approach like this ensures that the information and data used for the review is consistent across academic units and informs strategic analysis. In addition, the inclusion of the chair and/or senior faculty from the program under review on the review committee has advantages. Just as the chair and senior faculty know the details of the programs, the faculty, and the students, they also have first-hand knowledge of macro trends, actions of competitors, and changes in the discipline.

When members of the faculty who are responsible for an academic program assist in aggregation, synthesis, and reporting of the required information and data, they have the opportunity to understand its impact in strategic analysis and university planning. Assuring that the academic program review generates the required internal and external information and that

faculty members are closely involved in the review process facilitates strategic analysis and increases the likelihood of faculty acceptance of strategic choices.

Conclusions

University administrators manage the risk associated with the allocation of limited resources in an ever-changing environment. Use of a product portfolio designed for higher education, the APPM, offers the opportunity to assess the strategic direction of specific academic programs relative to one another and relative to the institution. With a strategic direction, the implications for resource allocations become more obvious.

Two dimensions, program marketplace attractiveness and program and institution capabilities, define the APPM. Using relevant criteria to assess each dimension, administrators simultaneously consider multiple academic programs relative to strategic direction, resource allocation, financial returns, and importance to the institution. The complexity of the APPM allows for varied contingencies unique to academic organizations.

Academic administrators may use a broad set of planning tools to facilitate strategic analysis and choice. A product portfolio model like the APPM should be in this set. It provides a process that integrates external opportunities and internal capabilities, measured by a unique set of relevant criteria, across multiple academic programs. Leveraging the results of the APPM, administrators prepare themselves to manage resources, control risk, and influence outcomes for the long-term well-being of the academic institution.

REFERENCES

Baker, M. J., King, M. F., Larick, D. K., & Carter, M. P. (2005). *Assessment and Review of Graduate Programs*. Washington DC: Council of Graduate Schools.

Dolence, M. G., & Norris, D. M. (1994, Summer). Using Key Performance Indicators to Drive Strategic Decision Making. *New Directions for Institutional Research, 1994*(82), 63 - 80.

Fathi, M. , & Wilson, L. (2009, April). Strategic Planning in Colleges and Universities. *The Business Renaissance Quarterly, 4*(1), 91 - 103.

Hunt, C. M., Oosting, K. W., Stevens, R. , Loudon, D. , & Migliore, R. H. (1997). *Strategic Planning for Private Higher Education*. New York: Haworth Press.

Kotler, P. , & Fox, K. F. (1985). *Strategic Marketing for Educational Institutions*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Lyle, N. A. (2007, Fall). Using a Portfolio Model to Prioritize Your Service Line Strategies. *Strategic Financial Planning*.

Machado, M. d., & Taylor, J. S. (2010, March). The Struggle for Strategic Planning in European Higher Education: The Case of Portugal. *Research in Higher Education Journal, 6*.

Murphy, D. E., & Stamtakos, L. C. (1989, Summer/Fall). University-wide Planning as an Integrative Decision-making Endeavor. *Journal of Higher Education Management, 5*(1), 27-35.

Navarro, J. R., & Gallardo, F. O. (2003). A Model of Strategic Change: Universities and Dynamic Capabilities. *Higher Education Policy, 16*(2), 199-212.

Newbould, G. D. (1980, Spring). Product Portfolio Diagnosis for U.S. Universities. *Akron Business and Economic Review*, 39-45.

Peterson, M. W., & Dill, D. (1997). *Planning and Management for a Changing Environment: A Handbook on Redesigning Postsecondary Institutions*. San Francisco: Jossey-Bass, Inc.
Pineno, C. J. (2008, November). The Business School Strategy: Continuous Improvement by Implementing the Balanced Scorecard. *Research in Higher Education Journal, 1*, 68-77.
Rowley, D. J., Lujan, H. D., & Dolence, M. G. (1997). *Strategic Change in Colleges and Universities*. San Francisco, California: Jossey-Bass.
Rowley, D. J., & Sherman, H. (2004). *Academic Planning: The Heart and Soul of the Academic Strategic Plan*. Lanham, Maryland: University Press of America, Inc.
Rowley, D. J., & Sherman, H. (2001). *From Strategy to Change: Implementing the Plan in Higher Education*. San Francisco: Jossey-Bass.
Shirley, R. C. (1988, Winter). Strategic Planning: An Overview. *New Directions for Higher Education, 1988*(64), 5-14.
Szekeres, J. (2010). Sustaining Student Numbers in the Competitive Marketplace. *Journal of Higher Education Policy and Management, 32*(5), 429-439.
Vitullo, E. , & Johnson, J. (2010). University Presidential Rhetoric and the 2008-2009 Economic Crisis. *Journal of Higher Education Policy and Management, 32*(5), 475-485.
Yip, G. S. (1981). Market Selection and Direction: Role of Product Portfolio Planning. Boston: Harvard Business School Publishing.

APPENDIX

Table 1: Dimensions and Criteria of the GE McKinsey Product Portfolio Model

Competitive Capabilities (Internal Factors)	Industry Attractiveness (External Factors)
Market share	Overall market size
Share growth	Annual market growth rate
Product quality	Historical profit margin
Brand reputation	Competitive intensity
Distribution network	Technological requirements
Promotional expertise	Inflationary vulnerability
Productive efficiency	Energy requirements
Unit costs	Environmental impact
Material supplies	Social trends
R&D performance	Legal issues
Managerial expertise	Political issues

Table 2: GE McKinsey Product Portfolio Model with Strategies

	Competitive Capabilities			
Industry Attractiveness		Weak	Moderate	Strong
	Highly Attractive	Withdraw from industry Invest to address weaknesses	Build selectively on strengths	Invest to grow Maintain strengths
	Moderately Attractive	Control risk Harvest products	Protect product Invest in selected market segments	Invest in selected market segments
	Unattractive	Divest Cut costs and investments	Concentrate on viable segments Minimize investments	Concentrate on viable segments Focus on current earnings

Table 3: Dimensions of the GE McKinsey Model Customized for the APPM

GE McKinsey Dimensions	Academic Program Portfolio Dimensions
Industry Attractiveness	Program Marketplace Attractiveness
Competitive Capabilities	Program and Institution Capabilities

Table 4: Criteria for the APPM

Program and Institution Capabilities	Program Marketplace Attractiveness
Market share	Student demand for degree
Share growth	Growth rate of student demand for degree
Quality of degree program	Employer demand for graduates
Reputation of degree program	Growth in employer demand for graduates
Market access to degree program	Number of Universities offering degree and extent of competition
Promotional effectiveness	Technological requirements necessary to offer degree
Graduation rate and time	Sensitivity of demand to economic conditions
Per student costs	Demand for intellectual capital of the program
Access to tangible resources	Social trends influencing market and employer demand
Research of faculty	Legal issues
Quality of faculty	Political issues

Table 5: Academic Program Portfolio Model

		Program and Institution Capabilities		
		Weak	Moderate	Strong
Attractiveness of Program Market	Highly Attractive	Withdraw from academic area Invest to address program weaknesses	Build selectively on program strengths Invest to build on strengths	Invest to grow academic program Maintain program strengths
	Moderately Attractive	Control risks of offering program Reduce academic program	Protect program Invest in select programs and select market segments	Invest in select market segments Invest in academic programs in niche areas
	Unattractive	Eliminate program Cut costs and investments	Concentrate on few market segments Minimize investments Reduce weak program areas	Concentrate on a few viable market segments Focus on redirecting strengths

Table 6: Criteria for Program and Institution Capabilities and Program Marketplace Attractiveness

Program and Institution Capabilities	Program Marketplace Attractiveness
Average market share over past 5 years	Potential student demand for degree over next five years
Quality and timeliness of degree program	Employer/graduate program demand for graduates over next five years
Reputation of degree program in region	Number and strength of competing universities
Consistency with university objective to collaborate with region for economic development	Sensitivity of student demand to economic conditions
Flexibility of faculty to vary class schedules, times, and locations	Rate at which required technology becomes obsolete
Average number of academic terms to complete the degree program	Political and social pressures on discipline
Number and quality of faculty committed to degree program	
Consistency of research interests of faculty teaching in the program	

Table 7: Criteria and Metrics for Assessment of Graduate Program in Chemistry

Graduate Program in Chemistry			
Program and Institution Capabilities	Relative Importance Weight	Value	Weighted Score
Average market share over past 5 years	0.15	4	0.6
Quality and timeliness of degree program	0.2	4	0.8
Reputation of degree program in region	0.2	3	0.6
Consistency with university objective to collaborate with region for economic development	0.15	3	0.45
Flexibility of faculty to vary class schedules, times, and locations	0.05	2	0.1
Average number of academic terms to complete the degree program	0.05	4	0.2
Number and quality of faculty committed to degree program	0.1	2	0.2
Consistency of research interests of faculty teaching in the program	0.1	3	0.3
	1.0		3.25
Program Marketplace Attractiveness			
Potential student demand for degree over next five years	0.2	3	0.6
Employer/academic demand for graduates over next five years	0.2	2	0.4
Number and strength of competing universities	0.15	3	0.45
Sensitivity of student demand to economic conditions	0.15	2	0.3
Rate at which required technology becomes obsolete	0.15	3	0.45
Political and social pressures on discipline	0.15	2	0.3
	1.0		2.5

Table 8: APPM Metrics for Graduate Programs in the Sciences

College of Arts and Sciences Science Programs	Composite Score for Program and Institution Capabilities	Composite Score for Program Marketplace Attractiveness	Relative Size of Academic Program Based on Number of Students
Chemistry	3.25	2.50	0.120
Biology	2.10	2.30	0.200
Biochemistry	1.95	4.00	0.043
Geology	4.00	1.50	0.167
Environmental Geology	4.70	4.60	0.04
Physics	3.00	4.50	0.18
Medical Sciences	2.10	4.70	0.25
			1.000

Figure 1: Academic Program Portfolio Model for the Sciences

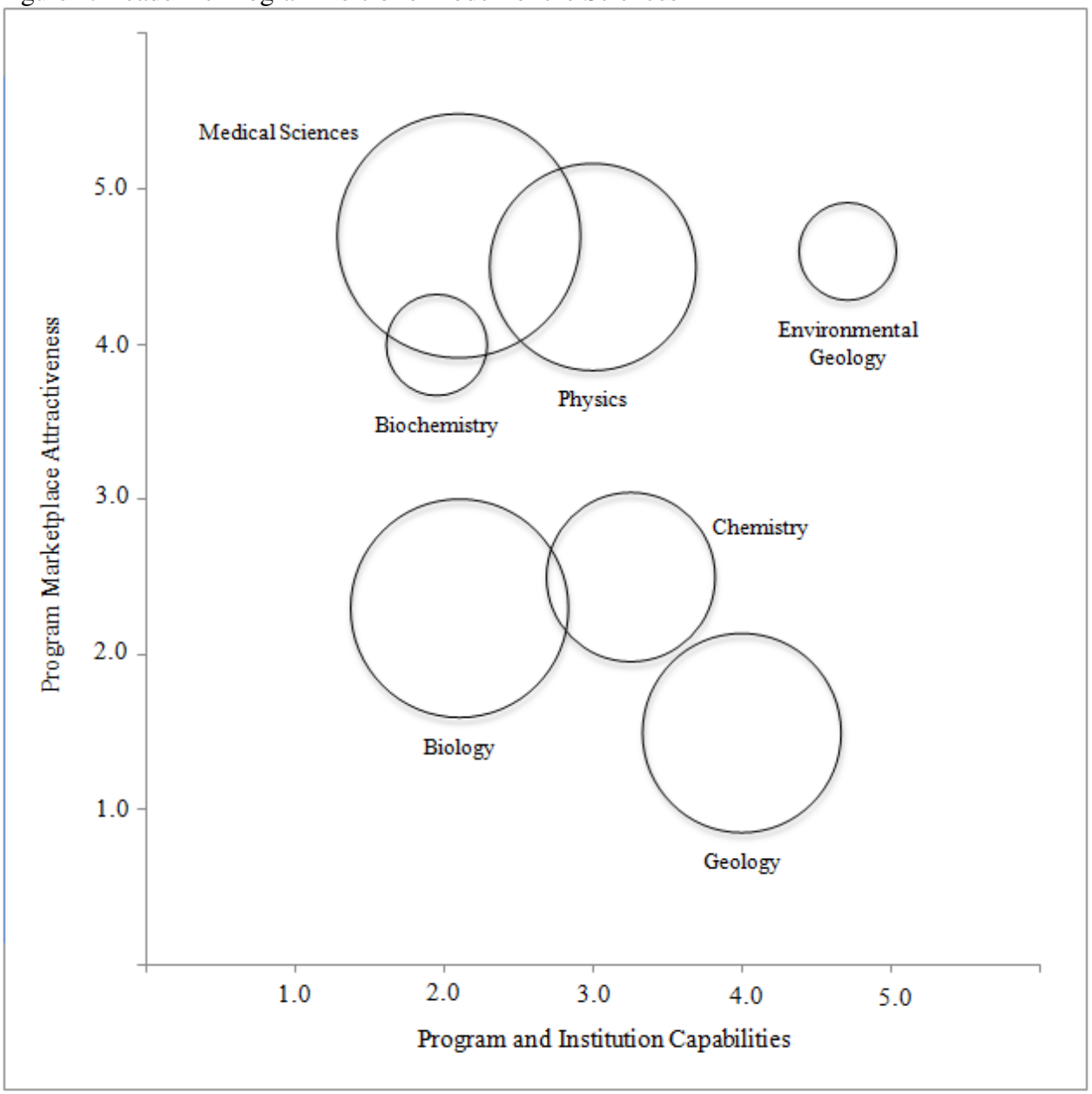
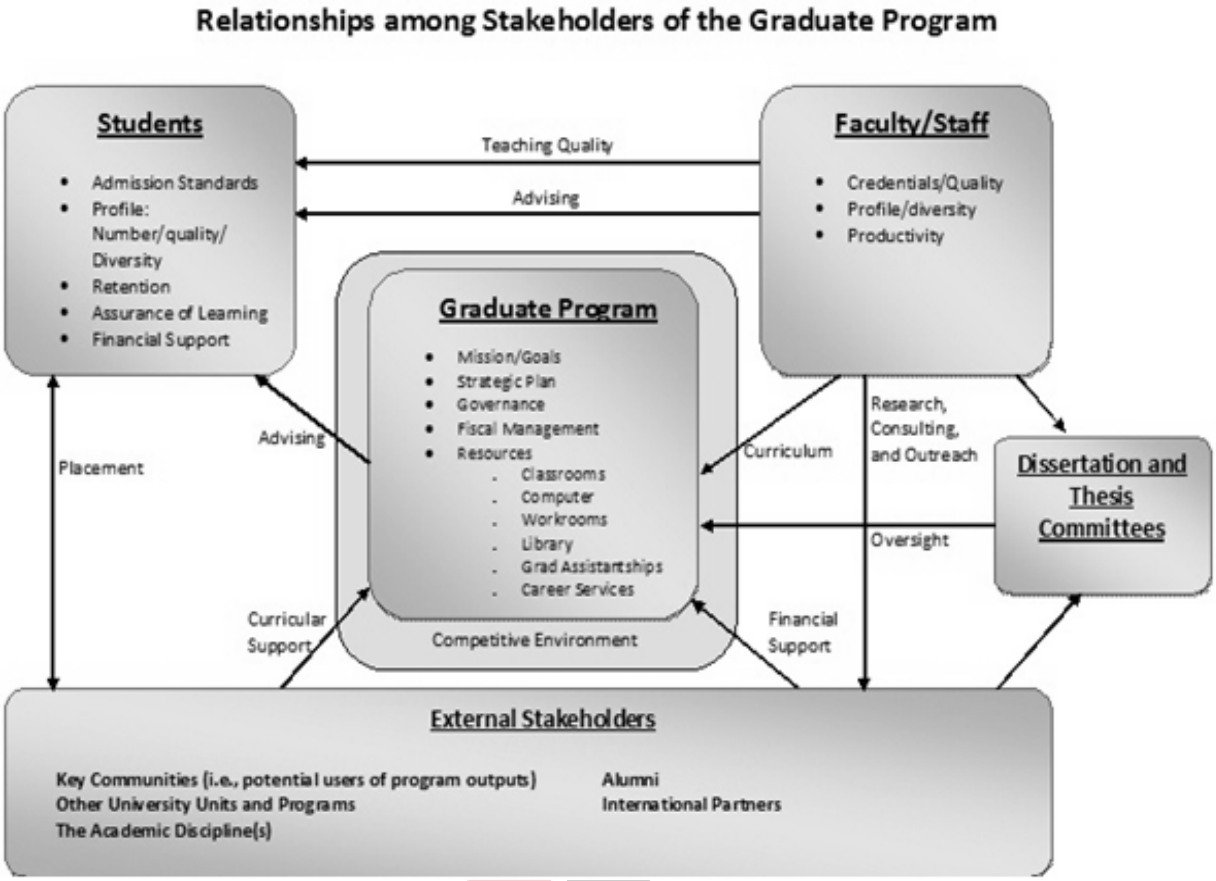


Figure 2: Systems Approach to Graduate Program Review



Source: School of Business Administration MBA Program Review 2008-2009