

Title: Competitive Resource-Based View Strategy Portland State University Library

Course Title: Competitive Strategies in Technology Management Course Number: ETM 627 Instructor: Dr. Charles Weber Term: Winter Year: 2015 Author(s): Michael Clark, MLS

Report No.: Type: Student Project Note:

ETM OFFICE USE ONLY

Abstract

Technological innovation and the information age have significantly impacted academic libraries roles in higher education. Patrons' diverse needs require that academic libraries provide dynamic services and resources. Within resource constraints, academic libraries face the challenge of identifying and investing appropriately in specific resources that will effectively and efficiently meet patrons' complex needs. The purpose of this study is to develop a competitive resource based view strategy for the Portland State University Library.

Introduction

Over the past two decades, patrons' needs have shifted academic libraries' priorities from capital-intensive to human resources and informationintensive [1]. Library space is transitioning from book and serial stacks to collaborative spaces for working, accessing information and communicating with colleagues [2]. Advances in technology have introduced an array of virtual services and digital resources [3]. Patrons expect that library staff will be available 24/7 and skilled in navigating and managing complex information. A key issue academic libraries face is how to efficiently manage specific resources and effectively maximize the educational impact for students [4].

The PSU Library seeks to address this issue by developing a competitive resource based view strategy. The strategy will guide continuous improvements in materials and services to improve efficiency and effectiveness. The primary research question is which resources should the PSU Library invest in to yield the greatest sustained competitive advantage over the next decade?

In this study, the goal is to develop a strategy with actionable, practical recommendations that clearly state which specific resources will yield a sustained competitive advantage for the PSU Library. Based on Barney's VRIN model, library resources are identified that are valuable, rare, difficult to imitate and difficult to substitute [5]. The PSU Library is compared to libraries at competing universities to determine how efficiently it utilizes those resources using data envelopment analysis (DEA) [4]. The results are analyzed and a strategy is presented with actionable, practical recommendations that clearly

state which specific resources will yield a sustained competitive advantage for the PSU Library.

Literature Review

The resource-based view of the firm focuses on a firm's internal resources in determining a strategy for sustained competitive advantage. According to Wernerfelt, a firm's strategy should be based on it's strengths (internal resources) and how it will develop those strengths for the future [6]. Barney defines firm resources as "...all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" [5]. Resources are grouped in the categories of physical capital, human capital, and organizational capital [5]. Physical capital is a firm's building, equipment, technology and location. Human capital is the experience, judgment, and intelligence of the firm's workers. Organizational capital is the firm's structure, planning, controlling and coordinating systems, and informal networks.

Barney states that firms can achieve a competitive advantage with their resources by "…implementing a value creating strategy not simultaneously being implemented by any current or potential competitors" [5]. Within the environment, firm resource heterogeneity and firm resource immobility must exist [5]. Firm resource heterogeneity is defined as resources vary across firms. Firm resource immobility occurs when competing firms are unable to obtain resources from other firms or the general resource market.

Firms achieve a sustained competitive advantage when other firms are unable to duplicate the benefits of a competitive advantage [5]. Barney's VRIN model describes the four criteria resources must meet for sustained competitive advantage: Value, rareness, imperfect imitability, and imperfect substitutability [5]. Valuable resources allow a firm to implement strategies that improve efficiency and effectiveness. Rare resources are unique and not held by a large number of firms. Imperfectly imitable resources cannot be easily obtained by competing firms due to unique historical conditions, causal ambiguity, or social complexity. Imperfect substitutable resources cannot be replaced by similar or very different resources as strategic substitutes.

The resource-based view of the firm is beginning to be more widely adopted within the public administration literature [7]. Public organizations are accountable for efficiently and effectively utilizing their resources to meet the unique needs of their diverse stakeholder communities. Bryson, Ackermann, and Eden have developed a strategic model that aids public organizations with mapping distinctive resource competencies, objectives and stakeholder expectations to improve efficiency [8]. Chan surveyed Canadian public libraries to identify the key resources and competencies that improve performance [9]. However, the library literature has primarily focused on the effectiveness aspect of libraries by assessing which services meet the expectations of patrons [4][10][11]. These qualitative assessments provide useful information for strategic planning and quality improvement processes. These methods do not clearly identify which internal library resources are critical to ensuring a sustained

competitive advantage. In addition, these methods do not adequately address the efficiency aspect which measures the transformation of resources (inputs) into services (outputs) [4].

Librarians have traditionally measured efficiency by developing single factor productivity indexes [12]. For example, a per unit circulation transaction cost is calculated by several libraries. The library with the lowest per unit circulation transaction cost becomes the efficient standard that all other libraries should strive to emulate. However, libraries serve patron populations with diverse needs and may not need to provide the same type or level of service as other libraries [13]. For example, a library may invest a higher level of resources in processing interlibrary loan transactions and less on purchasing new materials for the collection. Another issue is that a single factor productivity index only measures one area of a library's performance. It is challenging to combine several single factors to measure total library efficiency because each library would need to assign relative weights that reflect the level of service they provide [14]. The data envelopment model (DEA) addresses many of the limitations of single factor productivity indexes.

DEA measures the relative efficiencies of a decision making unit (DMU) with multiple inputs and outputs [15]. Each library being compared is a single DMU. All DMUs are compared to each other to identify an efficiency frontier. DMUs on the efficiency frontier are operating at full efficiency. All DMUs receive an efficiency score for comparison purposes. DEA allows the weights of each input and output to vary until an ideal combination is identified that will maximize

each DMU's efficiency score. Set weight restrictions can be added to inputs and outputs, but are not required.

Since it's inception in 1978, DEA has been used in over 1500 studies to compare banks, schools, hospitals, libraries and other institutions [16][17][18][19] [20]. DEA has been applied to libraries since the early 1990's [21][22][23][24] [4][25][26][27]. DEA is an appropriate methodology for library benchmarking for the following reasons: 1) It assesses efficiency based on multiple inputs and outputs without requiring output price or profit data, 2) It quantifies inefficiencies and shows a target to reach full efficiency, and 3) It identifies best practice libraries and encourages continuous learning processes to improve [28].

Methods

The purpose of this study is to identify and develop the PSU Library's resources that will yield the greatest sustained competitive advantage over the next decade. A focus group of PSU librarians was convened to identify the PSU Library's key resources by applying Barney's VRIN methodology [29][5]. The librarians identified human resources and materials as key firm resources for competitive advantage (Figure 1).

	Human Resources	Materials
Valuable	Improving services and access to subject expertise	Improving ease of access to and variety of resources available (consortia)
Rare	Localized expertise	Special collections and archives
Imperfectly Imitable	Social complexity – Subject liaisons to units	Unique historical conditions – collection development
Non-Subsitutable	Knowledge transfer and learning curve	Some similiarities, but less substitutions with consortia

Figure	1.	PSU	Library	y VRIN	Mode
--------	----	-----	---------	--------	------

Human resources are valuable due to the unique skills and knowledge that staff contribute to the library [30]. Staff strive to continually improve services and share their subject expertise to meet patron's specific needs. Staff are rare due to being attuned to local patron's unique needs and customizing the expertise they provide through reference and other services. The subject liaison relationships that librarians have with units across the university demonstrates social complexity that is imperfectly imitable and non-subsitutable [31]. Staff can be substituted by hiring other staff and implementing new technologies, to a degree. However, there would be a learning curve and incomplete knowledge transfer that would adversely impact the Library's efficiency and effectiveness for a period of time.

The variety of materials in the collection is valuable due to patron usage. The Library is improving ease of access through enhancements to the electronic catalog and to ORBIS consortia resources. The Library's special collections and archives contain rare materials that meet specific patron and university needs. Collection development over time reflects the university's unique historical culture and is imperfectly imitable. The materials in the collection were selected based on the university's academic program needs and faculty's specific research needs. Materials could be substituted, but that would require a substantial capital investment, which would be unlikely. Within the ORBIS consortia, the libraries make a concerted effort not to duplicate materials unless there is high patron demand for specific items.

The focus group discussed Data Envelopment Analysis (DEA) and decided it was the most appropriate research methodology to benchmark the PSU Library. DEA has been used in several published benchmarking studies of libraries [21][22][23][4][25][26][27]. The previous mentioned studies provided the focus group with guidance for developing the two models and the appropriate selection of specific inputs and outputs. An input orientation was selected due to the pressure on libraries to reduce the resources (inputs) they use to provide quality services and resources (outputs) to their patrons. Super-efficiency with constant returns to scale was added to the models to provide an efficiency ranking for all libraries (DMUs). The models were run through the Benchmarking package in the statistical software program R Studio [32].

Human Resources Model

The human resources model compares how efficiently libraries utilize their staff in providing services and resources (Figure 2). The inputs include: Weighted total professional librarian and staff FTE, weighted total support staff FTE, and total student staff FTE. Professional staff generally have more service capability than support staff and student staff. A weight restriction was applied in the model where weighted total professional librarian and staff FTE plus total support staff FTE plus total student staff FTE. Support staff also generally have more service capability than student staff. Another weight restriction was applied where weighted total staff also generally have more service capability than student staff. Another weight restriction was applied where weighted total support staff also generally have more service capability than student staff. Another weight restriction was applied where weighted total support staff FTE plus total student staff FTE equaled the sum of total support staff FTE.

Figure 2. Human Resources Model



The outputs include: Total interlibrary loans (ILL) transactions provided, total ILL transactions received, total circulation transactions, total workshop attendance, total weekly service hours, total weekly gate count, and total books and serials purchased. Support and student staff generally process ILL transactions, circulations transactions, assist with adding new book and serials to the collection, and staff service desks. Professional librarian and other staff develop and present workshops, engage in collection development activities including adding books and serials to the collection, and staff reference desks. <u>Materials Model</u>

The materials model compares how efficiently libraries convert their holdings into use by patrons (Figure 3). The inputs include: Total books and serials held, and total books and serials purchased. The outputs include: Total interlibrary loans (ILL) transactions provided, total ILL transactions received and

total circulation transactions. Efficient collection development practices ensure better access and increased circulation of scholarly resources.

Figure 3. Materials Model



The PSU Library is compared to libraries at competing universities for the academic year 2011-2012. Data is from the U.S. Department of Education's National Center for Education Statistics Academic Libraries Survey [33]. The competing libraries are determined by PSU's Office of Institutional Research and Planning (OIRP) and by the Carnegie Classification of Institutions of Higher Education. Universities that compete with PSU for student enrollment and research funding are identified by the following criteria: Public control, doctoral graduate program(s), high to very high research activity, have similar missions statements, and serve urban populations and/or are located in the western United States.

PSU OIRP identified 9 competing libraries from public, urban research universities in the United States: George Mason University (GMU), Indiana University/Purdue University at Indianapolis (IUPUI), San Diego State University (SDSU), The University of Texas at Arlington (UTA), University of Illinois at Chicago (UIC), University of Memphis (UM), University of Toledo (UT), University

of Wisconsin at Milwaukee (UWM), and Western Michigan University (WMU) [34].

The Carnegie Classification of Institutions of Higher Education identified 26 competing libraries from public, research universities with doctoral programs in the western United States: University of Alaska-Fairbanks (UA-F), Arizona State University (ASU), University of Arizona (UA), Northern Arizona University (NAU), California State University-Sacramento (CSU-S), San Francisco State University (SFSU), Idaho State University (ISU), University of Idaho (UI), The University of Montana (TUM), Montana State University (MSU), University of Nevada-Las Vegas (UN-LV), University of Nevada-Reno (UN-R), Oregon State University (OSU), University of Oregon (UO), Utah State University (USU), University of Utah (UU), University of Washington-Seattle (UW-S), Washington State University (WSU), University of California-Berkeley (UC-B), University of California-Davis (UC-D), University of California-Irvine (UC-I), University of California-Los Angeles (UC-LA), University of California-Riverside (UC-R), University of California-San Diego (UC-SD), University of California-Santa Barbara (UC-SB), and University of California-Santa Cruz (UC-SC) [35]. Due to incomplete reported data, University of California-Berkeley was excluded from analysis.

Analyses and Results

Human Resources Model

The human resources model compares how efficiently libraries utilize their staff in providing services and resources (Figure 4). The PSU Library had the

highest super-efficiency score (1.7413) in the human resources model. A review of the data indicates that the PSU Library used a relatively small number of support staff and student FTE and had high collection usage, as reflected by ILL and circulation transactions. The UC-SB Library had the next highest superefficiency score (1.7362). With twice as many staff as the PSU Library, the UC-SB Library's physical space and programming activities encourage approximately four times as many patrons to visit the library. However, UC-SB patrons are using the collection less than PSU Library patrons, according to total ILL and circulation transactions.



Figure 4. Human Resources Model Results

Library

GMU	IUPUI	PSU	SDSU	UTA	UIC	UM	UT	UW-M	WMU
0.3890	0.9761	1.7413	1.1137	0.6321	0.7226	1.2812	1.3886	1.3557	0.5824
ASU	CSU-S	ISU	MSU	NAU	OSU	SFSU	TUM	UA-F	UA
0.7138	1.1390	1.2294	1.5694	1.1312	0.9096	1.3238	0.8069	0.9612	0.7625
UC-D	UC-I	UC-LA	UC-R	UC-SD	UC-SB	UC-SC	UI	UN-LV	UN-R
0.9141	1.0635	0.8626	1.2880	0.7148	1.7362	0.8979	1.1023	0.8350	0.5641
UO	UU	UW-S	USU	WSU					
0.8689	0.6316	1.4564	0.9554	1.4404					

The PSU Library is identified as the primary peer for eight libraries (Table 1). These libraries could potentially learn human resources best practices from the PSU Library. The PSU Library has a higher super-efficiency score than its top five peers. However, the PSU Library could potentially benefit from best practices with the following strategies:

- Increase the number of new serials and books added to the local collection by hiring additional librarians for collection development, and shifting appropriate tasks from the librarians to support and student staff.
 Consult with the UW-S Library and IUPUI Library for best practices.
- Increase circulation transactions by automating processes, shifting appropriate tasks to student staff, and completing implementation of the ORBIS consortia catalog. Consult with the SFSU Library and UW-S for best practices.
- Increase workshop attendance by hiring additional librarians to develop and provide information literacy training, and shifting appropriate tasks from the librarians to support and student staff. Consult with the WSU Library, SFSU Library and MSU Library for best practices.
- Increase patrons' visits by re-designing the physical and introduce new programming. Consult with the MSU Library for best practices.

	Peer 1	Peer 2	Peer 3	Peer 4	Peer 5
GMU	UI (0.4271)	UT (0.2588)	UC-R (0.1302)	UW-M (0.0886)	WSU (0.0498)
IUPUI	PSU (0.9175)	UC-R (0.1529)	WSU (0.1144)	-	-
PSU	WSU (0.3794)	MSU (0.3183)	IUPUI (0.2996)	SFSU (0.1712)	UW-S (0.0159)
		CSU-S	UC-SB		-
SDSU	MSU (0.8413)	(0.4162)	(0.1929)	UW-M (0.0971)	
					UC-SB
UIA	MSU (0.8254)	UW-M (0.1775)	SDSU (0.0978)	UC-R (0.0550)	(0.0272)
UIC	PSU (1.5703)	-	-	-	-
UM	UC-R (0.6988)	MSU (0.2919)	PSU (0.0325)	-	-
UT	ISU (1.0360)	UC-R (0.1945)	UW-M (0.1336)	-	-
UW-M	UT (0.4063)	WSU (0.2913)	USU (0.2663)	PSU (0.1720)	UW-S (0.0660)
WMU	UM-W (0.3257)	PSU (0.2670)	UT (0.2294)	WSU (0.0477)	UC-R (0.0003)
	CSU-S				-
ASU	(0.7870)	UW-S (0.2972)	SFSU (0.2412)	PSU (0.1154)	
CSU-S	UW-M (0.2678)	PSU (0.1977)	SDSU (0.1798)	UW-S (0.0659)	-
ISU	MSU (.04541)	UA-F (0.2327)	UT (0.0971)	UM (0.0396)	-
MOLL			UC-SB		-
MSU	ISU (0.5727)	UI (0.4238)	(0.1082)	PSU (0.0180)	
NAU	PSU (0.7347)	UI(0.2271)		-	-
OSU	PSU (0.5139)	UW-M (0.4735)	UT (0.2007)	-	-
SFSU	PSU (1.1188)	UI (0.1173)	-	-	
TUM	UT (0.2934)	ISU (0.2309)	UI (0.2089)	PSU (0.1761)	SFSU (0.0885)
UA-F	ISU (0.8443)	MSU (0.3637)	-	-	-
			CSU-S		UW-S (0.0636)
	PSU (0.5206)	UC-R (0.4458)	(0.2413)	U1(0.1481)	
UC-D	UC-I (0.5378)	SFSU (0.3479)	PSU (0.1694)	UW-S (0.0476)	-
UC-I	UC-R (1.1630)	UW-S (.0857)	PSU (0.0431)	-	-
UC-LA	UW-S (0.9960)	UC-I (0.2817)	-	-	-
UC-R	UM (0.7703)	UC-I (0.3608)	UT (0.0273)	-	-
UC-SD	UC-I (0.5643)	SFSU (0.4064)	UC-R (0.1482)	UW-S (0.1344)	-
UC-SB	SDSU (1.7262)	MSU (0.6780)	UC-R (0.0174)	-	-
UC-SC	SFSU (0.4712)	PSU (0.2323)	UT (0.1506)	UC-R (0.0690)	UW-S (0.0311)
UI	MSU (0.6644)	SFSU (0.1840)	WSU (0.0625)	UW-M (0.0320)	UC-R (0.0175)
			UC-SB		UC-R (0.0155)
UN-LV	PSU (0.5544)	UW-M (0.3246)	(0.2334)	MSU (0.0647)	
	CSU-S				-
	(0.4002)		000-101 (0.0910)	PSU (0.0000)	
00	PSU (1.9501)	UC-R (0.2507)	-		-
	WSU (1.0526)		-	-	-
UW-S	UVV-M (2.1941)	UC-LA (0.5995)	-	-	-
			00-50		-
	1000-101 (0.4022)	SEGU (0.1799)		F 30 (0.0327)	
VVSU	077-171 (1.2089)	SFSU (0.5806)	FSU (0.3721)	-	-

Table 1. Human Resources Model Results - Peer Libraries

Peer relationships are sorted by largest lambda values indicated in parentheses.

Materials Model

The materials model compares how efficiently libraries convert their holdings into use by patrons (Figure 5). The ASU Library had the highest superefficiency score (3.6075) in the materials model. A review of the data indicates that the ASU Library has the fifth largest collection size and the third highest volume of circulation transactions. The PSU Library had the fifth highest superefficiency score (1.2278). With approximately one third the size of the ASU Library's collection, the PSU Library processes a higher volume of ILL transactions to meet patrons' needs. The GMU Library received a 0 superefficiency score because it did not report any outputs (ILL and circulation transactions). The UIC Library received an infeasibility error because it did not report if any new books and serials (inputs) were added to the collection.



Figure 5. Materials Model Results



GMU	IUPUI	PSU	SDSU	UTA	UIC	UM	UT	UW-M	WMU
0.0000	0.8431	1.2278	0.4932	0.4926	1.9761	0.2266	0.2390	0.6824	0.4073
ASU	CSU-S	ISU	MSU	NAU	OSU	SFSU	TUM	UA-F	UA
3.6075	0.7906	0.1401	0.6414	1.7202	0.8320	1.6326	0.4702	0.2704	0.2974
UC-D	UC-I	UC-LA	UC-R	UC-SD	UC-SB	UC-SC	UI	UN-LV	UN-R
0.3216	0.4835	0.7421	0.2795	0.6648	0.4115	0.6537	0.4139	0.6106	0.6606
UO	UU	UW-S	USU	WSU					
0.8035	0.4479	1.0203	0.3372	0.8610					

The PSU Library is identified as the primary peer for two libraries (Table 2). These libraries could potentially learn materials best practices from the PSU Library. The PSU Library has a higher super-efficiency score than two of its top three peers. However, the PSU Library could potentially benefit from best practices with the following strategies:

- Increase circulation transactions by updating collection development processes to ensure that relevant materials are acquired and maintained. Consult with the SFSU Library and NAU Library for best practices.
- Increase the local collection size to meet growing institutional needs and to reduce the reliance on ILL transactions. A budgetary investment will be required for new materials and additional librarians engaged in collection development. Consult with the NAU Library for best practices.

	Peer 1	Peer 2	Peer 3	Peer 4
GMU	-	-	-	-
IUPUI	PSU (1.0258)	SFSU (0.1154)	-	-
PSU	NAU (7.9112)	SFSU (0.4679)	IUPUI (0.3509)	-
SDSU	NAU (7.3356)	SFSU (0.4220)	ASU (0.174)	-
UTA	NAU (4.4246)	SFSU (0.2194)	PSU (0.0125)	-
UIC	MSU (6.2469)	-	-	-
UM	NAU (2.0949)	PSU (0.2354)	-	-
UT	NAU (2.9774)	UW-S (0.0313)	SFSU (0.0144)	-
UW-M	NAU (1.0088)	SFSU (0.0837)	UW-S (0.0779)	-
WMU	NAU (6.1336)	SFSU (0.3267)	UW-S (0.0126)	-
ASU	MSU (18.8294)	NAU (5.8137)	-	-
CSU-S	NAU (1.6052)	SFSU (0.6186)	UW-S (0.0592)	-
ISU	NAU (8.9541)	SFSU (0.0486)	PSU (0.0179)	-
MSU	UIC (0.1452)	ASU (0.0348)	-	-
NAU	OSU (0.3996)	UIC (0.2794)	ASU (0.0037)	-
OSU	NAU (1.1453)	UW-S (0.0540)	SFSU (0.0501)	-
SFSU	PSU (0.6171)	ASU (0.1176)	UW-S (0.0099)	-
TUM	NAU (2.0305)	SFSU (0.2553)	PSU (0.1202)	-
UA-F	NAU (4.9631)	PSU (0.0854)	UIC (0.0230)	-
UA	NAU (1.0758)	SFSU (0.6356)	UW-S (0.0401)	-
UC-D	NAU (3.9330)	SFSU (0.6886)	UW-S (0.0963)	-
UC-I	NAU (4.8128)	SFSU (0.2809)	UW-S (0.1217)	-
UC-LA	SFSU (3.7732)	UW-S (0.5378)	-	-
UC-R	NAU (5.0062)	SFSU (0.2638)	UW-S (0.0168)	-
UC-SD	NAU (4.6447)	SFSU (0.3344)	UW-S (0.2657)	-
UC-SB	NAU (1.4167)	-	-	-
UC-SC	NAU (2.7103)	SFSU (0.3013)	UW-S (0.0748)	-
UI	NAU (2.2240)	SFSU (0.2617)	UIC (0.0570)	ASU (0.0010)
UN-LV	NAU (3.5005)	SFSU (0.5015)	UW-S (0.0514)	-
UN-R	NAU (3.2827)	SFSU (0.2309)	UW-S (0.0461)	-
UO	NAU (1.3899)	PSU (0.9357)	-	-
UU	NAU (8.9291)	SFSU (0.9806)	UW-S (0.0226)	-
UW-S	SFSU (5.8890)	NAU (2.5291)	-	-
USU	NAU (4.1885)	SFSU (0.2905)	UW-S (0.0041)	-
WSU	NAU (8.0083)	PSU (0.9038)	-	-

Table 2. Materials Model Results - Peer Libraries

Peer relationships are sorted by largest lambda values indicated in parentheses.

Limitations and Future Research Opportunities

One of the key limitations of the study is the data available for the selection of inputs and outputs. Digital resources and services have expanded rapidly over the past two decades and are an integral part of libraries today [36]. The model could be strengthened with the inclusion of digital resources and services data [37].

Shim questions how information from DEA can be transformed into actionable, practical recommendations for library efficiency improvement [4]. From the perspective of a librarian, he states that how the DEA model functions is difficult to understand, the results can be difficult to interpret, and that most skilled DEA practitioners are economists that evaluate libraries from a distance [38]. He proposes the following solutions: 1) Form a small group of libraries that will adopt DEA as a benchmarking methodology, 2) Collaborate with DEA researchers so that librarians can learn the methodology, 3) Follow up on DEA benchmarking results with case studies that validate results, and 4) Identify processes and practices at efficient libraries, and disseminate the knowledge in the library community.

Future research should combine the DEA efficiency results and the patron service survey effectiveness results to guide the Library with continuously improving processes, resources and services. The PSU Library might also consider incorporating the Malmquist Productivity Index into the model to assess productivity changes over time [39]. Another potential area for future research

could be adding student success factors to the model to assess for educational impact.

Conclusion

Academic libraries, such as the PSU Library, are struggling to adapt to evolving technologies, a disinvestment of state government financial support, and the rapidly rising cost of materials. This study demonstrates how Barney's VRIN model and DEA can easily be used, as an evaluation tool, by faculty in their advisory and advocacy shared governance roles to strengthen their libraries. Compared to competing institution's libraries, the PSU Library should pursue the following resource-based strategies to yield the greatest sustained competitive advantage:

- Increase the number of new serials and books added to the local collection. Requires hiring additional librarians for collections development and increasing the materials budget.
- Increase the total number of circulation transactions. Requires further automation, completing the ORBIS consortia catalog integration, and updating collection development processes.
- Increase patron workshop attendance numbers. Requires hiring additional librarians for developing and conducting information literacy training opportunities.
- Increase the number of patron's visits to the Library. Requires developing new programming and re-designing the physical space.

References

- [1] S. C. Michalak, "This Changes Everything: Transforming the Academic Library," *J. Libr. Adm.*, vol. 52, no. 5, pp. 411–423, Jul. 2012.
- [2] S. E. Montgomery and J. Miller, "The Third Place: The Library as Collaborative and Community Space in a Time of Fiscal Restraint," *Coll. Undergrad. Libr.*, vol. 18, no. 2/3, pp. 228–238, Apr. 2011.
- [3] E. Leonard and M. J. Morasch, "If You Can Make it There, You Can Make it Anywhere: Providing Reference and Instructional Library Services in the Virtual Environment," *J. Electron. Resour. Librariansh.*, vol. 24, no. 4, pp. 257–267, Oct. 2012.
- [4] W. Shim, "Applying DEA Technique to Library Evaluation in Academic Research Libraries," *Libr. Trends*, vol. 51, no. 3, p. 312, Winter 2003.
- [5] J. Barney, "Firm Resources and Sustained Competitive Advantage," *J. Manag.*, vol. 17, no. 1, p. 99, Mar. 1991.
- [6] A. Lockett, R. P. O'Shea, and M. Wright, "The Development of the Resource-based View: Reflections from Birger Wernerfelt," *Organ. Stud.* 01708406, vol. 29, no. 8/9, pp. 1125–1141, Aug. 2008.
- [7] K. Szymaniec-Mlicka, "Resource-based view in strategic management of public organizations - a review of the literature," *Manag. 1429-9321*, vol. 18, no. 2, pp. 19–30, Dec. 2014.
- [8] J. M. Bryson, F. Ackermann, and C. Eden, "Putting the Resource-Based View of Strategy and Distinctive Competencies to Work in Public Organizations," *Public Adm. Rev.*, vol. 67, no. 4, pp. 702–717, Aug. 2007.
- [9] D. C. Chan, "Core competencies and performance management in Canadian public libraries," *Libr. Manag.*, vol. 27, no. 3, pp. 144–153, May 2006.
- [10] B. Stoffel, "Services in a Changing Academic Library: Patron Feedback and Library Response," *Evid. Based Libr. Inf. Pract.*, vol. 4, no. 4, pp. 84–87, Dec. 2009.
- [11] K. Angell, "Open source assessment of academic library patron satisfaction," *Ref. Serv. Rev.*, vol. 41, no. 4, pp. 593–604, Nov. 2013.
- [12] G. Reichmann and M. Sommersguter-Reichmann, "University library benchmarking: An international comparison using DEA," *Int. J. Prod. Econ.*, vol. 100, no. 1, pp. 131–147, Mar. 2006.
- [13] C. Kao and Y.-C. Lin, "Evaluation of the university libraries in Taiwan: total measure versus ratio measure," J. Oper. Res. Soc., vol. 55, no. 12, pp. 1256–1265, Dec. 2004.
- [14] E. S. Saunders, "Cost efficiency in ARL academic libraries," *Bottom Line Manag. Libr. Financ.*, vol. 16, no. 1, pp. 5–14, Feb. 2003.
- [15] A. Charnes, W. W. Cooper, and E. Rhodes, "Measuring the efficiency of decision making units," *Eur. J. Oper. Res.*, vol. 2, no. 6, pp. 429–444, Nov. 1978.
- [16] R. D. Banker, A. Charnes, and W. W. Cooper, "Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis," *Manag. Sci.*, vol. 30, no. 9, pp. 1078–1092, Sep. 1984.
- [17] R. G. Dyson and E. Thanassoulis, "Reducing Weight Flexibility in Data Envelopment Analysis," J. Oper. Res. Soc., vol. 39, no. 6, pp. 563–576, Jun. 1988.

- [18] W. W. Cooper, R. G. Thompson, and R. M. Thrall, "Introduction: Extensions and new developments in DEA," Ann. Oper. Res., vol. 73, no. 1–4, pp. 3–45, Aug. 1997.
- [19] J. K. Sengupta, "Production Frontier Estimation to Measure Efficiency: a Critical Evaluation in Light of Data Envelopment Analysis," *Manag. Decis. Econ.*, vol. 8, no. 2, pp. 93–99, Jun. 1987.
- [20] A. Emrouznejad, "An extensive bibliography of Data Envelopment Analysis (DEA), Volume I: Working Papers." Business School, University of Warwick, Coventry, England.
- [21] M. S. Easun, "Identifying efficiencies in resource management: An application of data envelopment analysis to selected school libraries in California. Ph.D. Diss." University of California, Berkeley, 1992.
- [22] C. J. Hammond, "Efficiency in the provision of public services: a data envelopment analysis of UK public library systems," *Appl. Econ.*, vol. 34, no. 5, pp. 649–657, Mar. 2002.
- [23] K. R. Sharma, P. Leung, and L. Zane, "Performance measurement of Hawaii state public libraries: An application of Data Envelopment Analysis (DEA)," *Agric. Resour. Econ. Rev.*, vol. 28, no. 2, pp. 190–198, 1999.
- [24] Tser-yieth Chen, "An evaluation of the relative performance of university libraries in Taipei," *Libr. Rev.*, vol. 46, no. 3, p. 190, Mar. 1997.
- [25] D. F. Vitaliano, "Assessing Public Library Efficiency Using Data Envelopment Analysis," *Ann. Public Coop. Econ.*, vol. 69, no. 1, pp. 107–122, Mar. 1998.
- [26] A. Worthington, "Performance indicators and efficiency measurement in public libraries," Aust. Econ. Rev., vol. 32, no. 1, p. 31, Mar. 1999.
- [27] "Faculty Senate Library Committee 2000 Annual Report." Portland State University.
- [28] G. Reichmann, "Measuring University Library Efficiency Using Data Envelopment Analysis," *Libri Int. J. Libr. Inf. Serv.*, vol. 54, no. 2, pp. 136–146, Jun. 2004.
- [29] "PSU Librarian Focus Group," 04-Feb-2015.
- [30] B. D. Steffy and S. D. Maurer, "Conceptualizing and Measuring The Economic Effectiveness of Human Resource Activities," *Acad. Manage. Rev.*, vol. 13, no. 2, pp. 271–286, Apr. 1988.
- [31] P. M. Wright, G. C. McMahan, and A. McWilliams, "Human resources and sustained competitive advantage: a resource-based perspective," *Int. J. Hum. Resour. Manag.*, vol. 5, no. 2, pp. 301–326, May 1994.
- [32] P. Bogetoft and L. Otto, "Benchmarking Package (R Software)."
- [33] "National Center for Education Statistics Academic Libraries Survey." U.S. Department of Education.
- [34] "Portland State University Peer Institutions." Office of Institutional Research and Planning.
- [35] "Carnegie Classification of Institutions of Higher Education." Carnegie Foundation for the Advancement of Teaching, 2015.
- [36] D. Law, "Academic Digital Libraries of the Future: An Environment Scan," New Rev. Acad. Librariansh., vol. 15, no. 1, pp. 53–67, Apr. 2009.
- [37] Y. Noh, "Evaluation of the resource utilization efficiency of university libraries using DEA techniques and a proposal of alternative evaluation variables," *Libr. Hi Tech*, vol. 29, no. 4, pp. 697–724, Nov. 2011.

- [38] J. A. McDonald and Micikas, L.B., *Academic libraries: The dimensions of their effectiveness.* Westport, CT: Greenwood Press, 1994.
- [39] J. Simon, C. Simon, and A. Arias, "Changes in productivity of Spanish university libraries," *Omega*, vol. 39, no. 5, pp. 578–588, Oct. 2011.