

Improving Research Support Services in Indonesian Academic Digital Libraries: A Recommendation for Business Process Reengineering Implementation Strategies

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Abstract

The increasing role of Indonesian academic digital libraries in research support services has the consequences of changing the business process. Business process reengineering (BPR) needs to be implemented with business models and business processes that have been developed. Successful implementation requires appropriate strategies according to specific characteristics. This study aims to develop a BPR implementation strategy for improving research support services in Indonesian academic digital libraries. The study is qualitative research with a grounded theory method (GTM) approach. Interviews were conducted with four academic library managers with predetermined characteristics. Coding, memoing, and constant comparison are looping data analyses to achieve data saturation. Strategy recommendations and related issues are mapped in a diagram. This research has designed 36 strategies to address issues arising in implementing BPR in Indonesian academic libraries. The strategy is unique regarding several issues that have not emerged in previous research. This is triggered by the characteristics of academic libraries as nonprofit organizations and the management of research resources that require collaboration between units. The main issues that arise are staff awareness, improvement motivation, gradual implementation, limited resources, lack of cooperation, lack of top management support and communication, limited budget, and monitoring and evaluation. In contrast to previous studies conducted on BPR implementation strategy in profit organizations, this study designed the implementation strategy of BPR for

nonprofit organizations, especially for academic digital libraries toward research support services.

Introduction

Research support services are a global issue and have been implemented in various countries. Previous research has identified the types of services and ranked countries that have implemented these services in academic libraries (Si et al. 2019). The ranking is calculated by identifying services that have been carried out by the world's top academic libraries. To see the impact of this implementation on research performance, this study compares this ranking with the country's performance ranking based on the number of publications conducted by Scimago (2022). The comparison (Table 1) shows that countries that implement research support services well in academic libraries have a good performance rating. This shows that research support services have a strategic role in improving university research performance. Although there are other factors, library information services are an important factor that affects research performance (Rubbia et al. 2014). This success is a lesson for countries that are struggling to improve their research performance, including Indonesia. In Indonesia, higher education is a major contributor to research performance, and this is increasingly encouraging academic libraries to improve their research support services. Previous studies have shown the weak adoption of research support services in Indonesian academic libraries (Maryati et al. 2020). Improvement of research support services can be done by adding or improving existing service business processes. Thus, academic libraries need to rethink and redesign their business processes toward improving research support services. This is defined as business process reengineering (BPR).

Table 1. Comparison of Country Rankings Based on the Implementation of Research Support Services in Academic Libraries (Si et al. 2019) with Country Rankings Based on Research Performance (Scimago 2022).

	Country Rank Based on Publication Performance Indexed by Scopus (Scimago 2022)	Country Rank Based on Research Support Services Adoption in Academic Digital Libraries (Si et al. 2019)
Ranking	Country	Country
1	United States	United States
2	China	United Kingdom
3	United Kingdom	China
4	Germany	Australia
5	Japan	Canada
6	France	Sweden
7	India	Singapore
8	Italy	The Netherland
9	Canada	New Zealand
10	Australia	Ireland

A model that shows value, key activities, key resources, customer segments and relationships, channels, cost structure, and revenue streams from research support services in the Indonesian academic library was created in a previous study (Maryati et al., 2022). From this model, business processes are then derived which are proposed to be adopted by academic libraries that will implement BPR towards research support services. BPR implementation requires the appropriate strategy to be successful. According to Fasna, several issues such as the participation of the process owner, monitoring, support from management, and low commitment are several concerns in BPR implementation that must be addressed by the organization. Several other issues related to financial support, human resource support, top management support, and legal issues are the keys to successful BPR implementation (Fasna and Gunatilake 2020; Wu 2002). However, Indonesian academic digital libraries have specific characteristics that will affect their implementation strategy. The human resource factor, the method of managing research results, and supporting policy factors are the characteristics that distinguish it from other organizations. Knowledge, education, and age gaps in human resources can create resistance to change, which can hinder BPR implementation. Supporting policies related to the handover and management of research results that have not been fully handled by the library are also characteristics that distinguish Indonesian academic libraries

from others. Strategies need to be developed according to these characteristics so that they can become recommendations that are suitable for implementation in Indonesian academic libraries.

This study aims to design a strategy for implementing BPR in research support services in Indonesian academic libraries. This research also contributes to the successful adoption of BPR.

Literature Review

BPR toward Research Support Services

Indonesian academic libraries need to rethink and redesign services to increase the adoption of research support services. According to Peters (2022), library activities serve the same goals of the institution. The academic library as a unified system contributes to the success of achieving university performance. Balancing this dynamic is one of the success factors of the academic library system.

Maryati et al. (2022) have developed a research support service business model that shows business values, namely increased access, time-savings, accuracy, communication, information according to user needs, and convenience/usability. The business model has been cascaded into business processes. To fulfill these business processes, the Indonesian Academic Library needs to make improvements to existing business processes. BPR is a tool that is widely recommended for business process improvement in universities (Cavalheri et al. 2016; Maharana and Panda 2001).

BPR is defined as the fundamental rethinking and redesigning of a series of activities to produce something of value (Avison and Fitzgerald 2006; Caeldries, Hammer, and Champy 2001; Fasna and Gunatilake 2020). Previous research has shown evidence of the effectiveness of BPR on customer satisfaction and retention in the manufacturing industry (Mukwakungu, Mabasa, and Mamela 2018). The survey results in this study showed an increase in the level of customer satisfaction in terms of speed of service, suitability for needs, and ease of getting service. Other research shows that information and communication technology (ICT)-enabled BPR improves user satisfaction and financial performance (Lee, Chu, and Tseng 2011).

Implementation Strategy of BPR

Several studies have developed theories for successful BPR implementation. Yeh and Walter (2016) stated that the process of careful selection of the best “fitness-of-use” system is one of the critical success factors in the implementation of information system migration. Fasna

and Gunatilake have identified various theories of failure and success that resulted in the formulation of BPR implementation strategies. In this study, the implementation strategy was divided into three phases, namely the pre-implementation phase, the implementation phase, and the post-implementation phase. This strategy was developed based on a for-profit organization (Fasna and Gunatilake 2020). In contrast to that research, the strategy in this article is built for implementation in nonprofit organizations. Nevertheless, various issues that arise can be used as a theoretical basis for developing strategies for nonprofit organizations. Similar issues may occur in both types of organizations, but the strategies developed differ according to the type of organization.

Indonesian academic libraries are nonprofit organizations that have unique characteristics. Importantly, academic libraries provide intangible services to their users, with each user having their own unique needs (Cavalheri et al. 2016). Meanwhile, the Indonesian academic library environment has unique human resource characteristics, different ways of managing research resources, and different supporting policies. Therefore, in this study, we focus on developing the appropriate implementation strategy for changing the business processes of academic digital libraries, especially research support services.

GTM in Information Systems Research

The grounded theory method (GTM) is a qualitative data analysis method used to build a theory, whether it is the development of a pure theory or enriching and sharpening a phenomenon. This method has long been adopted in information systems (IS) research. GTM has been used to develop theories related to information systems implementation strategy. In previous research, GTM has been used to design a DevOps (Development and Operations) implementation strategy in software development in an organization. The research resulted in six unique strategies used by organizations in the implementation of DevOps (MacArthy and Bass 2021). Another study used GTM in designing strategies to overcome the psychological problems of research lecturers in dealing with disruptive technological innovations. (Weihang, Feng, and Bu 2021). The two studies show the effectiveness of GTM in developing implementation strategy theory in the field of information systems research.

Bryant and Charmaz (2019) have defined the criteria that a study must meet to be considered GTM based on reviews of IS research articles. The following are some of the approaches used in this study to achieve the GTM research criteria. There is no evidence of references related to the strategy of implementing research support services in academic

libraries, especially in Indonesia. The unique academic library environment requires specific theories that cannot be immediately adopted from the existing theory of implementation strategies. However, existing theories are used as points of data collection. Data collection according to GTM criteria uses purposive sampling theory, which is a sampling technique with several criteria or certain reasons. Criteria, a specific characteristic that must be met in the sample, are set according to research objectives. The specific criteria for this study are presented in the methodology section. Data collection is stopped when data saturation is reached.

Methodology

This study uses a qualitative method with a grounded theory method (GTM) approach with guidelines developed by Bryant and Charmaz (2019). Data obtained from expert interviews were determined through the purposive sampling method (Creswell 2014). Respondents are managers of four libraries that meet the specified criteria and have held the position for more than five years. Requests for interviews were sent via e-mail addresses obtained from information on the website of the academic library that met the specified criteria. The specified criteria are the existence of a vision, mission, or assignments that have been carried out by the academic library in research support services. This criterion was collected based on the library's website. Libraries representing highly reputable and non-reputable universities according to global rankings (QS Quacquarelli Symonds Limited 2020) were selected.

Data were collected by interview with a semi-structured method. The interview was conducted through an online Zoom meeting. Interview recordings were transcribed into text documents. Before the interview, the experts had studied the research support service business processes proposed to be carried out by the BPR. Experts were asked for their opinions regarding the issues faced by the academic library in implementing BPR toward research support services. The main issues were used as an initial guide with new issues emerging during the interview. Strategies are explored from these issues. The main issues are (1) changes in the role of libraries in research support services, (2) top management support, (3) cooperation between units, (4) resistance to change, (5) availability of prototypes as the implementation of business processes, and (6) monitoring and evaluation. The emerging issues during the interview were added as the next question interview.

Data analysis consisted of coding, memoing, and constant comparison. The coding stages were open coding (marking every important sentence in each line of text), axial coding (determining categories and subcategories with thematic analysis), and selective coding

(mapping to present the relationship between the proposed strategy and strategy issues that arise). Memoing is the documentation of the coding as outlined in the form of tables and diagrams. The constant comparison technique was used when iterating at the data collection and analysis stages. The results of data analysis are compared continuously with other examples. The emergence of a new concept can be a point for the next interview, and so on until data saturation is obtained, which is interpreted as no more new data that appears. The mapping of issues on the diagram is accompanied by interviewer numbering to see the emergence of new issues so they can be detected when saturation is reached.

Findings and Discussion

This research resulted in 12 issues with 36 strategies to overcome these problems. Some strategies are correlated with more than one issue. Internal communication deals with staff awareness issues and the threat of resistance emerging from staff and other units. Leadership motivation is also related to the lack of collaboration and support from top management.

The resulting issues and strategies are unique for the implementation of research support service business processes in academic libraries in Indonesia. The relationship of the strategy to the emerging problem issues is mapped in the diagram (Figure 1). Each issue and strategy that appears in the interview document is given an expert numbering code (1, 2, 3, 4) to show the achievement of saturation.

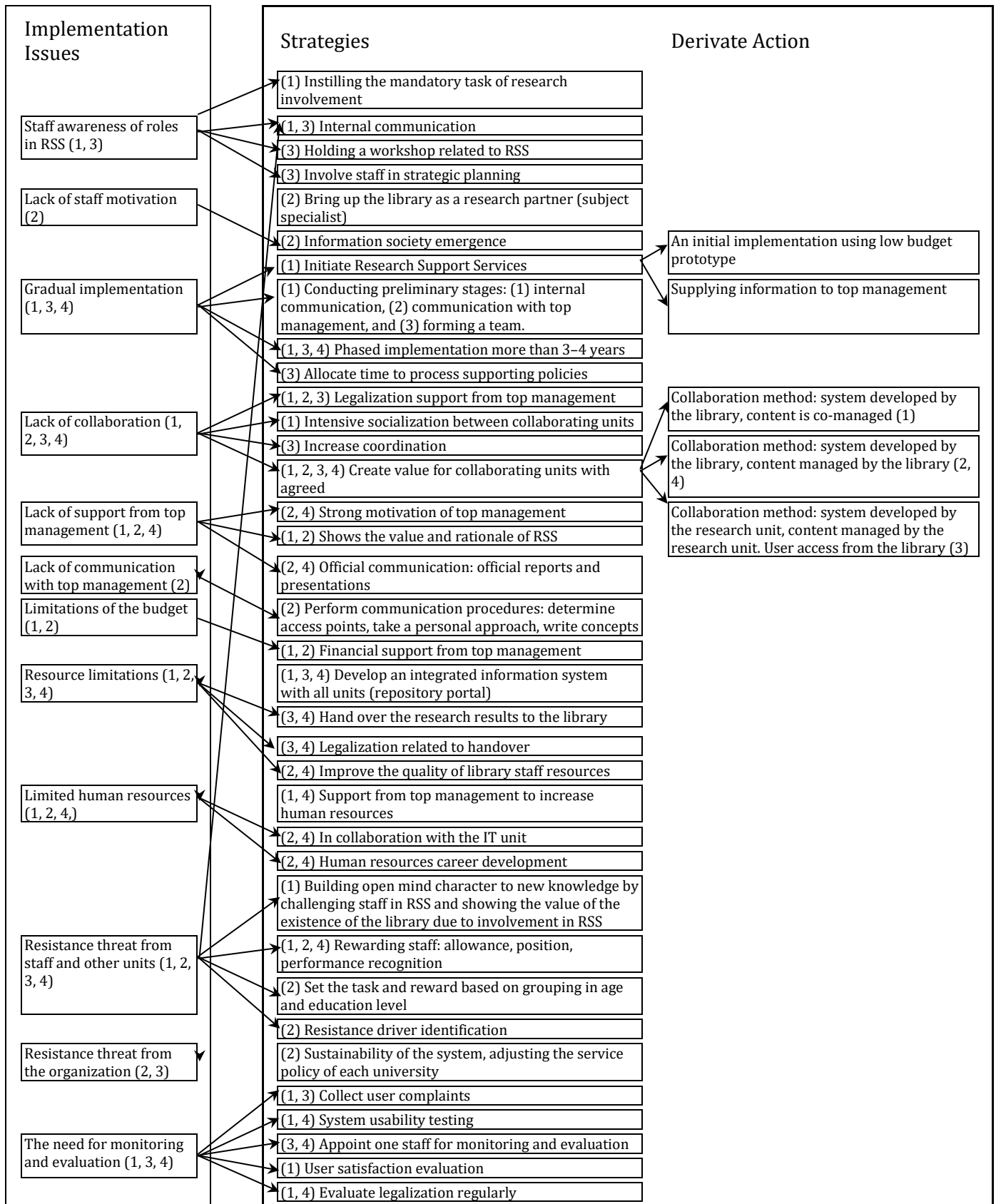


Figure 1. Recommended Strategy Mapping Related to Emerging Issues

Note: (1, 2, 3, 4) = numbering of experts interviewed

The following is a discussion of each issue and recommended strategies to address them.

Staff Awareness

Issues related to staff awareness of BPR in academic libraries arise because academic libraries are nonprofit organizations. In for-profit organizations, where human resources receive a profit-based fee, all parties will appreciate changes in business processes to generate higher profits more easily. This is why this issue does not appear in previous research conducted on a for-profit basis (Fasna and Gunatilake 2020). In this study, experts agree that staff awareness is an important issue that needs to be addressed for successful implementation. Several strategies have been formulated to address issues related to staff awareness.

Staff awareness is raised by instilling an understanding that higher education in Indonesia must carry out research in addition to teaching. Awareness of the demands of research output is expected to encourage staff awareness to take an active role in research support services. Therefore, research support services are recommended as an innovative step proposed by academic libraries to top management. Avison and Fitzgerald (2006) state this bottom-up approach is new in business process reengineering; the classical approach is generally top-down. This approach encourages the emergence of internal communication strategies to gain support from staff at the initiation stage. Staff also need to be involved in the preparation of a strategic plan. Several methods, such as holding workshops and internal meetings, can be used to involve all staff in planning.

Improvement Motivation

The experts argue that positioning librarians as partners in the research community (knowledge society) can be a trigger to improve motivation. This will increase the professionalism and role of the library in research support services. The proposed strategy is in line with some of the literature that has discussed the role of librarians as research partners in research support services.

In research support services, librarians have a new role as intermediaries and partners in the learning and research processes (Borrego and Anglada 2018). The role of librarians as partners is referred to as subject-based information experts (Sheridan Brown and Swan 2007; Revez 2018). The University of Queensland (UQ) libraries show best practices in making librarians partners by providing one-on-one services for researchers. The functional team provides consultations, advice, training, and support in publishing. Individual partnerships are also carried out through the provision of a comprehensive service around the analysis of the quality and influence of research outputs to support researcher grants and promotion applications (Brown et al. 2018). In practice, partnerships have obstacles caused by gaps in staff skills, knowledge, and confidence and resourcing issues (Kennan, Corral, and Afzal 2014). Therefore, the limited resource issue arises, which will be discussed in a separate section.

Gradual Implementation

This study recommends the gradual implementation of BPR. This means that changes are not made radically but are carried out incrementally (Avison and Fitzgerald 2006). Experts argue that the implementation phase lasts three to four years. The UQ library experience took six years (2011–17) to realign the organization to meet the demand for research support services (Brown et al. 2018).

Based on the experience of managing academic libraries, experts argue that time is required to provide the opportunity to optimize resources and develop the system, as well as to design procedures and guidelines. Time allocation is also needed to process policies, which generally takes approximately two years before they become integrated into institutional decisions. UQ library allocated time for staff growth and for improving librarian skills to experiment and maximize the use of new software and methodologies (Brown et al. 2018).

Based on this evidence, it is recommended to conduct the preliminary stage that begins with internal communication to produce a mature concept that will be delivered to top management. The next step needed in the preliminary stage is to form a team consisting of library staff, top management representatives, and representatives from other related units (research units and IT teams). The next stage is to perform the initial research support service. A small, low-budget project can be used as an initial service. This pilot is used to demonstrate the value of getting support from top management. Running a low-budget prototype developed as a model can convince policymakers. With this prototype, policymakers can see more clearly

the business processes of research support services. This prototype can be tested to get a positive response from users, which can be used to increase the confidence of policymakers.

Limited Resources

The limited resources faced by the academic library in providing research support services is an issue that emerged from three of the experts. This is in line with several previous studies stating that limited resources in terms of staff, budget, and equipment are an obstacle faced by academic libraries in research support services (Borrego and Anglada 2018). One study found that Italian scientific institutions and universities lack strong investments in human resources and infrastructures (Rubbia et al. 2014). Other studies identify the knowledge, skills gaps, and a lack of confidence among library staff as the most common constraints in carrying out the role of research support services (Kennan, Corral, and Afzal 2014; Borrego and Anglada 2018; Raju, Raju, and Johnson 2016). On the other hand, copyright and ownership of data issues, lack of national legislation, and lack of support for mandatory sharing of data are significant barriers to research data services (Raju, Raju, and Johnson, 2016).

Human resource support can mean an increase in the number of resources and an increase in the quality of resources. Increasing the number is very important at the initiation stage. Technical work with nonspecific requirements such as data input can be done by interns, but the quality of resources is enhanced by career development to improve skills and knowledge. Limited resources also need to be supported by adequate facilities and infrastructure.

Resourcing issues also arise in terms of research information and research document collections. Experts state that universities in Indonesia generally have research units that are not correlated with libraries in managing research results. In a previous study by Kennan, Corral, and Afzal (2014), this issue also emerged in academic libraries in various countries (Australia, New Zealand, the UK, and Ireland). The researchers stated research information services should be the crucial role of libraries rather than research administrators who have limitations in librarian services and expertise. Therefore, library collaboration with research units is a strategy proposed to overcome limited resources. Collaboration is proposed in the form of joint management with an integrated system. The research unit can be involved in acquiring and processing research resources to make them accessible to the user. This joint management method is discussed further on the issue of lack of cooperation.

Lack of Cooperation

Cooperation is an important issue in the implementation of BPR for research support services. The research unit is a key partner of the academic library in Business Model Canvas to collaborate on business processes (Maryati et al. 2022). This collaboration needs supporting policies and formal approval that is strengthened by top management so the proposed business process will become a mandate that must be carried out by all relevant parties.

To gain a common understanding of the duties and functions of each unit in collaborating business processes, the academic library needs to conduct intensive socialization and coordination. Active socialization is done through workshops or presentations attended by the units involved. Intensive coordination will reduce ambiguity regarding the expectations of work carried out by two or more units (Fasna and Gunatilake 2020). Much coordination is done in the early stages of implementation (pre-implementation phase).

Cooperation is expected to provide value for both parties (library unit and research unit). The value related to system development and management of research content is necessary to agree on the method of cooperation that will be used. There are differences of opinion among experts regarding the methods that can be used for the collaborative management of research results. The strategy recommendations are related to the co-creation theory (Schopf, Roche, and Hubert 2015; Zwass 2010).

The first recommendation adheres to the concept of collaborating. Based on this concept, it is recommended that a repository of research be developed and managed by the research unit, and the library unit can retrieve and present data on digital library applications. The expert thinks that the academic library is not ready to manage research results, but the information needs to be held by the library for open access.

The second concept adheres to the concept of tinkering. In this concept, one party can only modify the service with the terms and conditions determined by the other party. This concept has less open contribution than the other two concepts. In this case, the library develops and manages a repository, and the research unit provides sources of research results. This concept is recommended for mature academic libraries in both human resources and information technology. A library application has been developed that integrates the entire collection, including those in the research unit.

The third concept is embracing the concept of co-designing. In this concept, the repository of research results is developed by the library and the research unit fills in the content of the digital library application. These recommendations are proposed by experts from libraries

with a smaller scope who have flexibility in developing new business processes. Each academic library can choose from the three concepts that are appropriate considering their environment and the challenges that arise.

The expert also argues that the prototype developed can be used as an initial development that can be used for service initiation. The contribution shown by the initiation of the adoption of existing technologies can convince policymakers to provide support for further development.

Lack of Top Management Support and Communication

Similar issues related to the lack of support from top management also emerged in previous studies and were mentioned most frequently. Fasna and Gunatilake said that top management support has a significant effect on the successful implementation of business process changes (2020). This study recommends increasing the top management leadership. High motivation from the leadership is needed to obtain approval support in the early stages of implementation. Motivation can be built with awareness related to the value and rationale of the implementation of research support services shown at the service initiation stage. Official communication in the form of reports and presentations in workshops is considered effective for conveying information related to the value and rationality of new business processes. Based on expert experience, official communication also serves as evidence of the track record of the proposed BPR.

Communication with top management requires the appropriate strategy. Access points need to be known for smooth communication because of their role in setting the communication schedule with top management. Providing information services needed by top management is a personal approach to better communication. Through this, the awareness of the role of libraries in information services, especially research information, increased.

Limited Budget

The cost structure for software development is one of the key factors in the proposed business model. Therefore, a limited budget is an important issue that must be addressed. As a nonprofit organization, financial support from top management is natural. Support from top management can be obtained by predicting the financial needs and benefits obtained including the required payback period.

Dennis, Wixom, and Tegarden (2015) stated that economic feasibility analysis for system development in nonprofit companies is assessed as intangible benefits in the form of market expansion, brand recognition, product quality improvement, customer service improvement, and better supplier relationships. In the case of academic libraries, market expansion takes the form of increasing access and increasing the number of users. Brand recognition is related to increasing the role of libraries in research support services that will increase their existence. Product quality is in the form of better library services; in this case, the digital library is easier and more convenient to use, so it will improve the quality of consumer service. The relationship with suppliers is related to the provision of better open-access collections and the use of appropriate collection copyrights.

Threat of Resistance

In line with previous research, resistance is an issue that arises in implementing BPR. Fasna and Gunatilake (2020) have identified attitude and lack of communication and skills as the cause of staff resistance to BPR implementation. Identification of the origin of resistance can determine the appropriate strategy to overcome the issue. On the other hand, experts argued the emergence of resistance classifiable in certain age groups. Therefore, age grouping is necessary to hand out the appropriate tasks and special rewards or incentives.

The threat of resistance can also be overcome by building the character of the staff to be more open to new knowledge by providing new challenges and showing value related to the existence of libraries in research. It also requires more effective internal communication. The level of formal education will influence the effectiveness of internal communication. Ongoing education is one of the competencies that must be possessed by librarians who work in special libraries, including academic libraries (Khan and Parveen 2020).

Resistance can also emerge from the organization. Therefore, maintaining sustainability in system development needs to be done. The system needs to be supported by continuous research so that it can develop according to the context of each library.

As a nonprofit organization where BPRs are proposed in a bottom-up manner, the treatment of resistance is a major issue that must be addressed at the outset. The existence of resistance will reduce optimal teamwork, which complicates the initial stages of implementation.

Monitoring and Evaluation

Monitoring and evaluation is the final phase in the implementation of BPR. Various tests need to be done to see the effectiveness of the changes that have been made. Qualitative testing can be done by accommodating complaints from users. Quantitative testing can be done by testing the system's usability (systems usability testing) and testing user satisfaction. At this stage, it is also recommended to assign a person who is specifically responsible for monitoring and evaluation. Periodic evaluations also need to be carried out on supporting policies, regardless of whether it is still relevant to the current business process.

From the various issues that arise, it can be concluded that the implementation of BPR toward research support services in academic libraries is a service innovation that is developed on a bottom-up basis. The proposed BPR for research support services uses a new approach where changes are made incrementally with bottom-up involvement.

Conclusion

This study resulted in 36 recommended strategies to address issues arising in implementing BPR toward research support services in Indonesian academic libraries. The proposed strategy shows its uniqueness compared to previous studies. This study revealed issues related to staff awareness and collaboration between units. This relates to the type of academic library that is a nonprofit organization, which is different from previous research that uses profit organizations as a case study. The issue of collaboration between units arises in the business process of managing research results that are managed by two different units. The recommended collaboration method associated with the existing theory shows the adoption of the co-creation theory where cooperation aims to provide value for both units. BPR toward research support services in academic libraries is a bottom-up service innovation that needs to be proposed for implementation.

References

- Abdous, M'Hammed, and Wu He. 2008. "A Framework for Process Reengineering in Higher Education: A Case Study of Distance Learning Exam Scheduling and Distribution." *International Review of Research in Open and Distance Learning* 9, no. 3. <https://doi.org/10.19173/irrodl.v9i3.535>.
- Avison, David, and Guy Fitzgerald. 2006. *Information System Development*, 4th ed. Chicago: McGraw-Hill Education.

- Borrego, Á., and L. Anglada. 2018. "Research Support Services in Spanish Academic Libraries: An Analysis of Their Strategic Plans and of an Opinion Survey Administered to Their Directors." *Publications* 6, no. 4. <https://doi.org/10.3390/publications6040048>.
- Brown, Sarah, Elizabeth Alvey, Elena Danilova, Helen Morgan, and Amberlyn Thomas. 2018. "The Evolution of Research Support Services at an Academic Library: Specialist Knowledge Linked by Core Infrastructure." *New Review of Academic Librarianship* 24, no. 3–4: 339–50.
- Brown, Sheridan, and Alma Swan. 2007. *Researchers' Use of Academic Libraries and Their Services*. Research Information Network and Consortium of Research Libraries.
- Bryant, Antony, and Kathy Charmaz. 2019. *Current Developments in Grounded Theory*. London: Sage.
- Caeldries, Filip, Michael Hammer, and James Champy. 2001. *Reengineering the Corporation: A Manifesto for Business Revolution*. New York: Harper Business. <https://doi.org/10.2307/258943>.
- Cavalheri, E. H., M. Rudek, O. Canciglieri Jr., E. Minato, W. M. Almeida, and C. P. Da Veiga. 2016. "A Proposal for a BPR Based Method Applied to Higher Education Institutions." In *23rd ISPE Inc. International Conference on Transdisciplinary Engineering, TE 2016*, edited by W. J. C. Verhagen, M. Peruzzini, M. Borsato, J. Stjepandic, and N. Wognum, 4:451–60. Amsterdam: IOS Press BV. <https://doi.org/10.3233/978-1-61499-703-0-451>.
- Creswell, John W. 2014. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches 4th Ed.* London: Sage.
- Dennis, Alan, Barbara H. Wixom, and David Tegarden. 2015. *System Analysis & Design: An Object-Oriented Approach with UML*. Hoboken, NJ: Wiley.
- Fasna, M. F. F., and S. Gunatilake. 2020. "Towards Successful Strategies to Overcome BPR Implementation Issues: Case of Sri Lanka." *Business Process Management Journal* 26, no. 6: 1241–59. <https://doi.org/10.1108/BPMJ-03-2019-0087>.
- Kennan, Mary Anne, Sheila Corral, and Waseem Afzal. 2014. "'Making Space' in Practice and Education: Research Support Services in Academic Libraries." *Library Management* 35: 666–83. <https://doi.org/10.1108/LM-03-2014-0037>.
- Khan, Shakeel Ahmad, and Abida Parveen. 2020. "Professional Competencies for Librarians Working in Special Libraries: The Case of Pakistan." *Electronic Library* 38, no. 5–6: 1135–48. <https://doi.org/10.1108/EL-02-2020-0030>.
- Lee, Y.-C., P.-Y. Chu, and H.-L. Tseng. 2011. "Corporate Performance of ICT-Enabled Business Process Re-Engineering." *Industrial Management and Data Systems* 111, no. 5:

735–54. <https://doi.org/10.1108/02635571111137287>.

MacArthy, Ruth W., and Julian M. Bass. 2021. “The Role of Skillset in the Determination of DevOps Implementation Strategy.” In *Proceedings—2021 IEEE/ACM Joint 15th International Conference on Software and System Processes and 16th ACM/IEEE International Conference on Global Software Engineering, ICSSP/ICGSE 2021*, 50–60. <https://doi.org/10.1109/ICSSP-ICGSE52873.2021.00015>.

Maharana, B., and K. C. Panda. 2001. “Planning Business Process Reengineering (BPR) in Academic Libraries.” *Malaysian Journal of Library and Information Science* 6, no. 1: 105–11. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-22944474728&partnerID=40&md5=5ec72f283f16d690f78d9dfd61b74c8c>.

Maryati, Ira, Betty Purwandari, Harry Budi Santoso, Indra Budi, Iis Solichah, and Fuad Gani. 2022. “Research Support Services in Indonesian Academic Digital Libraries: A Proposed Business Model and Prototype Design.” *DESIDOC Journal of Library and Information Technology* 42, no. 1: 18–29. <https://publications.drdo.gov.in/ojs/index.php/djlit/article/view/17108>.

Mukwakungu, Sambil Charles, Matimba Davis Mabasa, and Tebogo Lucky Mamela. 2018. “The Effect of Business Processes Re-Engineering on Improving Customer Satisfaction & Retention in the Manufacturing Industry.” In *Proceedings of the International Conference on Industrial Engineering and Operations Management*. Johannesburg: South Africa.

Peters, Timothy. 2022. “An Introduction to Systems Thinking for Librarians.” *Library Leadership and Management* 36, no. 2: 1–12. <https://doi.org/10.5860/LLM.V36I2.7536>.

QS Quacquarelli Symonds Limited. 2020. “QS World University Rankings.” 2020. <https://www.topuniversities.com/university-rankings/world-university-rankings/2021>.

Raju, Reggie, Jaya Raju, and Glynnis Johnson. 2016. “Research Support Services in South African Academic Libraries.” In *Quality and the Academic Library: Reviewing, Assessing and Enhancing Service Provision*, 167–77. Amsterdam: Elsevier.

Revez, J. 2018. “Opening the Heart of Science: A Review of the Changing Roles of Research Libraries.” *Publications* 6, no. 1.

Rubbia, Giuliana, Ciro Franco, Dario Pellizzon, and Luca Nannipieri. 2014. “Research Support Services in Higher Education and Research Institutions: Approaches, Tools and Trends.” *Procedia Computer Science* 33: 309–14.

Schopf, Joachim, Julien Roche, and Gilles Hubert. 2015. “Co-Working and Innovation: New Concepts for Academic Libraries and Learning Centres.” *New Library World* 116, no. 1/2: 67–78. <https://doi.org/10.1108/NLW-06-2014-0072>.

Scimago. 2022. "Scimago Journal & Country Rank." Scimago Lab.

<https://www.scimagojr.com/countryrank.php>.

Si, L., Y. Zeng, S. Guo, and X. Zhuang. 2019. "Investigation and Analysis of Research Support Services in Academic Libraries." *Electronic Library* 37, no. 2: 281–301.

Weihang, Liu, Yang Feng, and Xinxin Bu. 2021. "Study on China University Research Teachers Psychological Problems and Strategies from the Perspective of Disruptive Technological Innovation." Proceeding of *The 2nd Information Communication Technologies Conference Study*, 381–85. Nanjing: IEEE. doi: 10.1109/ICTC51749.2021.9441648.

Wu, I.-L. 2002. "A Model for Implementing BPR Based on Strategic Perspectives: An Empirical Study." *Information and Management* 39, no. 4: 313–24. [https://doi.org/10.1016/S0378-7206\(01\)00099-4](https://doi.org/10.1016/S0378-7206(01)00099-4).

Yeh, S.-T., and Z. Walter. 2016. "Critical Success Factors for Integrated Library System Implementation in Academic Libraries: A Qualitative Study." *Information Technology and Libraries* 35, no. 3: 27–42. <https://doi.org/10.6017/ital.v35i2.9255>.

Yin Wang, Jun Du, and Jianxin (Roger) Jiao. 2010. "A Fundamental Framework of Business Process Reengineering Methodology Based on IT." In *2010 International Conference on Management and Service Science*, 1–4. Wuhan: IEEE.

Zwass, Vladimir. 2010. "Co-Creation: Toward a Taxonomy and an Integrated Research Perspective." *International Journal of Electronic Commerce* 15, no. 1: 11–48. <https://doi.org/10.2753/JEC1086-4415150101>.

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