Without research, no community service

Mahyuddin K M Nasution\textsuperscript{1,}\textsuperscript{*}, Tulus\textsuperscript{2}, Erman Munir\textsuperscript{3}, Onrizal\textsuperscript{4}

\textsuperscript{1}Biro Rektor, Universitas Sumatera Utara, Padang Bulan 20155 USU, Medan, Indonesia
\textsuperscript{2}Lembaga Pengabdian kepada Masyarakat, Universitas Sumatera Utara, Padang Bulan 20155 USU, Medan, Indonesia
\textsuperscript{3}Lembaga Penelitian, Universitas Sumatera Utara, Padang Bulan 20155 USU, Medan, Indonesia
\textsuperscript{4}Klinik Publikasi Ilmiah, Lembaga Penelitian, Universitas Sumatera Utara, Padang Bulan 20155 USU, Medan, Indonesia

E-mail: *mahyuddin@usu.ac.id

Abstract. Research is the duty of universities in addition to education. Meanwhile, the community service is a different task, but it becomes a bridge is to downstream both of them. This paper intends to describe the relationship between research and community service, which implies that prior to servicing the community, a necessity of its implementation requires research, to ensure that community service fulfills the achievement targets.

1. Introduction
One of the pillars of college life is community service \cite{1}. A purpose is to improve the quality of people’s lives \cite{2, 3}. There is an intangible physical environment of every activity of human life \cite{4, 5}. It is the environment that is undergoing continuous change, i.e. society \cite{6}. Society is a community that is outside the campus, and always gets the first exposure due to various technological changes and the application of science \cite{7}. Therefore, individuals and communities are happy with convenience, but antipathy with rules and restraints. While the technology offers convenience without no limit.

It’s not easy for people to use technology without the right instructions \cite{8}. However, technology is a knife with two different sharp edges. Misuse of technology can have the opposite effect on welfare \cite{9, 10}. Therefore, universities have the duty to provide opinions, directions, and guidance, which in the use of technology affects all the interests of the community, from food to health, for example. This paper intends to describe that task as an activity of community services.

2. Problem Definition
Community Service, or CS, is stated as an academic community activities that utilizes science and technology to advance the welfare of the community and enlighten the life of the nation \cite{11}. Based on this definition, every activity of CS must indirectly be depended on research \cite{12}, namely the use of science and technology. While both of them cannot be present if there is no research activity.

For that purpose, the implementers of the activities are academicians who have the capital of knowledge and expertise that will be provided to the community. They are lecturers, students,
Table 1. The CS workload of an academician for 40 hours per week

| No | Academician | Hours/week | Description |
|----|-------------|------------|-------------|
| 1  | Lecturer    | ≤ 4        | Required    |
| 2  | Student     | ≤ 4        | Suggestion  |
| 3  | Staff       | 0          | Auth        |

Table 2. The activities of CS

| No | Kegiatan                                                                                     |
|----|-----------------------------------------------------------------------------------------------|
| 1  | Supporting leaders position in government agencies/of state officials who must be released from their organic positions. |
| 2  | Carry out the development of educational outcomes, and research that can be utilized by the community/industry of each program. |
| 3  | Give training, counseling/upgrading/lecturing to the public, scheduled/programmed.           |
| 4  | Provide services to the community or other activities that support the implementation of government and development tasks. |
| 5  | Make/write community service that is not published by each work.                             |
| 6  | Publish it in periodical scientific papers/community services journals or appropriate technology, is a dissemination from the outputs of community service program each work. |
| 7  | Participate in the management of scientific journals (editors/editorial boards)               |

and education staff, each stated as follows:

(i) Lecturer\(^1\) is a professional educator and scientist with the main task of transforming, developing, and disseminating science, technology through education, research, and community service.

(ii) Student\(^2\) is designation for people who are pursuing higher education at a tertiary institution, or are recognized as students who receive scientific transformation.

(iii) Educational staff\(^3\) is members of the community who are dedicated and appointed to support the implementation of higher education, among others, librarians, administrative staff, laboratory assistants and technicians, as well as information engineering institutions.

The CS workload, for 40 hours per a week of each academician as an obligation is shown in Table 1, is \(40 \times 10\% = 4\) hours per a week.

CS is not only one of the activities in the form of education, but also as a follow-up of research known as a bridge of the research downstream \([13]\). Education is the process of interaction between learners (like students) and teachers (or lecturers) and learning resources in a learning environment such as class \([14]\). Research is an activity carried out according to scientific rules and methods systematically to obtain information, data, where information relating to the understanding and/or testing of a branch of science and technology \([15, 16]\). Therefore, every activity of CS follows a framework consisting of people, content, process, management, budget,

\(^1\) https://www.merriam-webster.com/dictionary/lecturer
\(^2\) https://www.merriam-webster.com/dictionary/student
\(^3\) https://www.merriam-webster.com/dictionary/staff
facility and infrastructure, evaluation, and results [17], whereby the activities of the community service are described in Table 2.

As a bridge for down-streaming research, the activities at least involve aspects of the results [18, 19]. Parallel to that, in the form of education, the activities of CS by students are under the guidance of lecturers so as to give a positive impression on the community, this is a result [20]. These results are based on the use, application, practice and cultivation of science and technology in order to advance the general welfare and intellectual life of the nation [21]. However, determining the outcome of each activity of CS, as a measure of success, is a necessity. As the performance of each implementation, both for the executor in person or organization, directly impacts the community.

3. Methodology
All program of CS aim to bridge the downstreaming of education and research [22, 23]. However, the methodology also bridges the downstreaming so that CS has a positive impact of change by involving stakeholders such as academia, business, and government [24]. Therefore, every program of CS based on the proposal of activity. The proposal aims to make a commitment (agreement) on CS activities and targets among the proposer and the donor.

In addition, the proposals aim to maintain and improve institutional management or community service functions, facilitate monitoring and evaluation of institutions or activities for the community. The proposal not only contains a work program, but the basis for making the program. In various sources, there is information or data that shows the need to carry out activities of CS [25, 26]. This expresses the importance of carrying out these activities and is usually the background for proposing the community service.

The importance of CS, supported by data or information from various sources, and it requires an analysis. However, any activities of CS requires a certain amount, type and specification of facilities and infrastructure [27]. Determination of the number, type and specifications in accordance with the funding and targets of community members, which a likely to be modeled in simple as follows:

\[
\begin{align*}
 a_1 x_1 + b_1 x_2 &= c_1 \\
 a_2 x_1 + b_2 x_2 &= c_2
\end{align*}
\]

(1)

where \( a_1 \) and \( a_2 \) each is the funds needed to finance one unit of equipment: \( x_1 \) and \( x_2 \), respectively; while \( b_1 \) and \( b_2 \) each is the funds needed to finance one unit of infrastructure: \( x_1 \) and \( x_2 \), respectively. \( c_1 \) and \( c_2 \) is are the constants of the possible matching [28, 29]. However, other models can be formulated in accordance with the calculation of interests and analyze them. Thus, in this case to carry out an activity of CS, it is necessary to first conduct research on the importance of carrying out an activity. Of course, the outcome of the research is the existence of a scientific report or publication that is a reference for a (next) proposal for CS [30, 31].

4. Discussion: Towards optimization
The performance target of all activities of CS, from three activities: education, research, and CS, a maximum of 10% for each academic activity [11, 32]. However, because the performance of CS activities overlaps with two other activities, it can indirectly reveal that the performance of CS activities can be optimized so that it can increase to 10% more, not more, see Figure 1.

The first (no. 1) activity in Table 2, for example, by occupying a leadership position in a government agency or a state official, in its implementation connotes that those who are appointed must have expertise and master the fields in accordance with the position in that government institution. Research activities, which have been carried out by them when they are students [33], sere as its benchmarks [34], namely their research outcomes such as scientific publications or other innovations [35]. However, leaders who succeed in their work, is they have
Figure 1. The parts of tree pilars, their overlap, and possibilities.

Figure 2. The research and CS at 2012-2018 of Universitas Sumatera Utara in relative position.

the initiative. Innovation will not come without the initiative and research [36]. Indirectly, it can be seen that the progress of the Province of Sumatera Utara (Sumut [37]) can be seen from the performance of the people who sit in their posts. As revealed in Figure 2, the average Human Development Index for seven year is 69.46%, which is not significant enough every year. As such, in this case, it means that leaders cannot become welfare agents.

Furthermore, the program of activities from CS, such as activities no. 2 and 3 (Table 2) in the field of education, is to make teaching materials or training modules for enriching learning resources, these materials can be in the form of intellectual property right (IPR) that can be applied directly by the community, business world, and/or industry, so that it is possible to increase the human development index quickly [38, 39]. Of course, the enrichment of learning resources is based on research activities, because after all the enrichment will come with the initiative to combine available experiences (references) and re-newel based on the interests that arise in the community [40].
Some programs of activity such as: Settling problems faced by the community by utilizing relevant academic community expertise; Utilization of appropriate technology; As well as the making of science and technology development materials, are programs that cannot but have to have the support of research or as research outputs, i.e., research results that can be applied directly and are needed by the user community; Research results as a development of science and technology in order to empower the community; Or as an application of appropriate technology that can be utilized in order to improve the standard of living and welfare of the community [11]. The last three activity programs, as part of activities 2 and 4, whereby research supports it. Thus, the inconsistency of conducting research (P-RD in Figure 2) results in the number of CS activities for each lecturer (3 lecturers for one proposal, for example) continuing to decrease (P-CS in Figure 2).

In addition, some results of research activities produce problem solving models, social engineering, policy recommendations that can be applied directly by the community, business, industry, and/or government. These are programs of activities 5 and 6 in Table 2. Of course, to support that activity, participation in managing scientific publications as an outcome of research as well as CS is an alternative to improving the quality of the activities of the two other pillars. Based on the case in the Universitas Sumatera Utara [38], although the number of indexed scientific publications keep increase (Docs in Figure 2), this does not have a direct impact on increasing the amount of CS. There is an assumption that research proven by scientific publications will only be bridged into CS after 2 (two) or 3 (three) years conducting research, it is a way, that is a science [41], and based on the figure there is a comparison between research and CS activities is 3 and 2, or it can be predicted the number of CS activities as follows,

\[ n(\text{ppm}) = \frac{lm}{jd} + \frac{la}{c} \]  

(2)

Where \( lm \) is the number of papers, \( la \) is the number of articles, \( jd \) is the number of lecturers, \( c \) is the constants 2, 3, or 5. Based on some descriptions above and Eqs. (1) and (2), it can stated that "no community services without research", it means that CS does not give an impression to the community before it is determined the importance of CS, where it is needed [42, 43, 44].

5. Conclusion

Based on an adaptive approach, or as a snapshot, there is a relationship between community service and research. Research functions to find solution to problems that are present in the community or scientifically present. On the different side, the community service is to bridge the research and the community interests (importance) that cannot be directly connected by other activities.

References

[1] N I Cruz, D E Giles, Jr. 2000 Where's the community in service-learning research? Michigan Journal of Community Service Learning.
[2] Z Azmi, M K M Nasution, M Zarlis, H Mawengkang, S Efendi 2019 Perceptron partition model to minimiza input matrix IOP Conference Series: Materials Science and Engineering 536(1).
[3] I Lubis, M K M Nasution, M Maulina 2018 Basic framework of urban design based on natural resources IOP Conference Series: Earth and Environmental Science 126(1).
[4] V Allee 2000 The value evalution: Addressing larger implications of an intellectual capital and intangibles perspective Journal of Intellectual Capital 1(1).
[5] I Lubis, M K M Nasution 2017 Probability model for designing environment condition Journal of Physics: Conference Series 801(1).
[6] M K M Nasution, M Maulina 2018 Calligraphy design for coconut garbage use IOP Conference Series: Earth and Environmental Science 126(1).
[7] W-M Roth, S Lee 2004 Science education as/for participation in the community Science Education 88(2).
[8] R A Vannatta, F Nancy 2004 Teacher dispositions as predictors of classroom technology use Journal of Research on Technology in Education 36(3).
[9] A Feenberg 1991 *Critical Theory of Technology* Oxford University Press.
[10] M K M Nasution 2005 Penguasaan sains dan teknologi Pengajaran Berbantuan Komputer (PBK) 2.
[11] Direktorat Jenderal Pendidikan Tinggi 2014 *Pedoman Operasional Penilaian Angka Kredit Kenaikan Pangkat/Jabatan Akademik Dosen* Kementerian Pendidikan dan Kebudayaan Tahun 2014.
[12] M K M Nasution 2016 Fenomena riset Harian Analisa.
[13] S Banerjee, P Lin 2003 Downstream R&D, raising rivals’ costs, and input price contracts *International Journal of Industrial Organization* 21(1).
[14] A Sivan, R A Stebbins 2011 Leisure education: definition, aims, advocacy, and practices - are we talking about the same thing(s)? *World Leisure Journal* 53(1).
[15] M K M Nasution, Onrizal, I Aulia 2019 Design of the research problem statement *Journal of Physics: Conference Series* 1235(1).
[16] M K M Nasution 2019 Research methodology *IOP Conference Series: Materials Science and Engineering*.
[17] M K M Nasution, T E Nuradi, R Syah 2017 SumutSiana: A framework for applying ICT to preserve the cultural heritage of Sumatera Utara Indonesia *Journal of Telecommunication, Electronic and Computer Engineering* 9(2-4).
[18] D Conrad, D Hedlin 1989 High school community service: A review of research and programs *ERIC, Office of Educational Research and Improvement* (ED), Washington, DC.
[19] D Conrad, D Hedlin 1991 School-based community service: What we know from research and theory *Phi Delta Kappan*.
[20] S L Roakes, D Norris-Tirrell 2000 Community service learning in planning education: A framework for course development *Journal of Planning Education and Research* 20(1).
[21] M K M Nasution 2001 Basis sains dan teknologi sebagai basis perekonomian Artikel & Resensi, *Suara USU*.
[22] L Frerichs, J Brittin, C Stewart, R Robbins, C Rights, S Mayberger, A Cervantes, T T-K Kuang 2012 SaludableOmaha: Development of a Youth Advocacy Initiative to preserve Community Readiness for Obesity Prevention, 20112012 *Prev. Chronic. Dis.*.
[23] M K M Nasution 2016 Hilirisasi penelitian berbasis teknologi pada perguruan tinggi *Harian Analisa*.
[24] H Etzkowitz, L Leydesdorff 1993 The triple helix as a model for innovation studies *Science & Public Policy* 25(3).
[25] Mahyuddin 1995 Pengantar sistem pengelolaan basis data - DBMS (Database Management System) *USU Press*.
[26] M K M Nasution, I Aulia, M Elveny 2019 Data *Journal of Physics: Conference Series* 1235(1).
[27] H Sartika, M D H Gamal 2019 Depot location problems by considering its distribution problems *Journal of Research in Mathematics Trends and Technology (JoRMIT)* 01(1).
[28] M K M Nasution 2018 Ontology *Journal of Physics: Conference Series* 1116(2).
[29] M K M Nasution 2018 The uncertainty: A history in mathematics *Journal of Physics: Conference Series* 1116(2).
[30] M K M Nasution 2016 Carut marut menulis karya ilmiah *Harian Waspada*.
[31] M K M Nasution 2018 No research without publication: Early mining *Journal of Physics: Conference Series* 978(1).
[32] M K M Nasution 2010 Suatu hubungan antara penelitian dan pengabdian kepada masyarakat *Translasi* 6.
[33] M K M Nasution 2016 Karya ilmiah dosen & mahasiswa *Harian Analisa*.
[34] M K M Nasution 2018 Pengantar dalam karya ilmiah *Teknik Penulisan Karya Ilmiah* 5.
[35] M K M Nasution 2019 Kesedapan penelitian *Translasi* 5.
[36] M K M Nasution, R Sitepu, Rosmayati, D Bakti, S M Hardi 2018 Research mapping in North Sumatra based on Scopus *IOP Conference Series: Materials Science and Engineering* 309(1).
[37] Nasution M K M 2018 SumutSiana *IOP Conference Series: Materials Science and Engineering* 309(1).
[38] M K M Nasution, R Sitepu, Rosmayati, M F G Siregar, B Syam, L Sihombing, Farhat, A S Rambe, M F Ganis Siregar, B Syam, L Sihombing, Farhat 2019 A design of
TALENTA research *IOP Conference Series: Earth and Environmental Science.*

[40] M K M Nasution 2018 Indonesia knowledge dissemination: A snapshot *Journal of Physics: Conference Series* 978(1).

[41] M K M Nasution 2019 Kelahiran sains *Translasi* 4.

[42] J C Mankins 1995 Technology readiness levels *A White Paper*.

[43] J C Mankins 2009 Technology readiness assessments: A retrospective *Acta Astronautica* 65(9-10).

[44] T Crosbie, J Broderick, M Short, R Charlesworth, M Dawood 2018 Demand response technology readiness levels for energy management in blocks of buildings *Buildings* 8(2).