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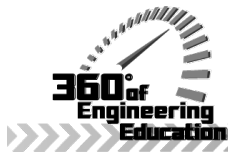
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Motivation of Community Partners and Advisors to Participate in Community Engagement Engineering Programs

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Abstract

Since 2000, research in the broader service-learning field has included partnerships and community voice, but this research trend has received little attention among engineering education scholars. This study aims to fill this gap by developing a richer understanding of community-university partnerships in engineering service-learning programs by exploring the perspectives of advisors and community partners in a well-established engineering service-learning program. In part inspired by the existing service-learning literature, this study addresses the question: Why are individuals and local community organizations involved in engineering service-learning partnerships? This study utilizes a single case study design, with data collection including in-depth interviews with community partners, faculty and program administrators (n=11) affiliated with the EPICS program at Purdue University. All interviews were transcribed and coded thematically. A set of deductive codes were developed and applied based on a review of three empirical studies examining the motivation of community organizations involved in service-learning programs. An inductive analysis was also used to discern new themes. This paper presents findings from this analysis, looking at the similarities and differences among participants and findings with studies of other non-engineering service-learning partnerships. The most recognized reason for involvement of the participants is to support engineering students with their education. Many of the community and advisors stated that they enjoyed the experience of service-learning, and the organization benefited directly from the partnership. Overall, this work helps clarify and address misunderstandings that engineering programs and community organizations may have relative to partner motivations. Based on this research the authors suggest that engineering programs increase emphasis on learning about the community organization within their stated learning objectives, since it is deemed important by the community partners and critical for effective relationship building and joint project work.

Introduction

Engineering community engagement can be seen as part of a wider movement across academia to create both curricular and extracurricular experiences where students have opportunities to serve local and/or global stakeholders. Such programs allow students to practice engineering problem solving in context while being a part of a larger community and providing service to others, thereby helping to bridge the gap between technical knowledge and its application. There are many types of community engagement programs within engineering, such as students who work as tutor to teach science and engineering topics at local schools¹, build a kiosk for a local children's museum², or design appropriate technologies for remote villages.³

As these examples suggest, the types of activities and projects undertaken by these students involve working closely with – and hopefully providing benefits for – partner organizations. This potential for mutual benefit resonates with the fundamental principal of reciprocity as embraced by the broader service-learning community, which means that each group in the partnership has agency in determining the partnership outcomes, and each should learn from the partnership.⁴ While the term reciprocity is not widely used in the engineering education community, likely

few would disagree with the importance of the concept. A service-learning experience needs to be beneficial to all stakeholders, including the university, community organization, community members, faculty, students, etc. This is a core value needed for success, and without it partnerships will likely be neither as effective nor as sustainable. The faculty and staff who participate in engineering community engagement are also often committed to benefitting the people and communities they serve, and frequently their motivations are focused on a commitment to caring for others. In light of this, engineering community engagement programs would benefit from a more explicit embrace and recognition of reciprocity in their partnerships.

Nonetheless, much prior research on engineering community engagement has focused primarily on students, including their learning, characteristics, experiences, etc. For instance, studies have shown that community engagement results in increased motivation among students in engineering courses⁵⁻⁶ and there is a higher interest in engineering community engagement among traditionally underrepresented student populations.⁷ However, little research to date has focused on the experiences of the community partners, which is somewhat surprising given that their participation makes such programs possible. This study aims to fill this gap by developing a richer understanding of community-university partnerships in engineering community engagement from the perspectives of academic programs and served communities. The specific research question we ask is: Why are individuals and local community organizations involved in engineering service-learning partnerships? Relevant sub-questions include: How do community members describe the motivations of their involvement in engineering service-learning? Does this differ from community members in other kinds of service-learning experiences? And what do the program and faculty perceive are the motivations and challenges of community partners?

To address these questions, we ground our research in the existing service-learning literature. The literature review summarizes findings from three key studies, including an overview of the motivations and challenges faced by the community partners they studied. These findings also informed data collection and analysis procedures for the present study, which involved typological and thematic analysis of semi-structured interviews with community members and advisors affiliated with the EPICS program at Purdue University (n=11). The research presented in this paper is also part of a larger dissertation research project involving study and comparison of three programs, with particular emphasis on understanding why individuals and organizations get involved with service-learning programs, how various program characteristics are related to the nature of service-learning partnerships, and the role of projects in partnerships. As suggested by the preliminary work presented here, better understanding some of the dynamics prevalent in many engineering service-learning partnerships can enable identification of best practices to strengthen and improve these relationships.

Literature Review

For more than a decade, the service-learning field has increasingly recognized a need to focus more research on community partnerships.⁸ Since then, a handful of studies have looked at what motivations drive community partners to get involved with service-learning programs. This section reviews and synthesizes studies by Sandy and Holland⁹, Worrall¹⁰, and Stoecker and Tryon.¹¹ These studies were chosen for the literature review because each of them examined a large number of community partners and classified their motivations for participating in

partnerships, while also highlighting challenges faced. While this review is not inclusive of all studies of service-learning partnerships, the three together provide a good overview of the reasons community members engage in service-learning partnerships. The methods of the studies are briefly reviewed, and a summary synthesis of their findings focuses on the motivations described by community partners, which in turn inform the deductive data analysis methods.

Methods of the Studies

Sandy and Holland's study addressed "community perspectives on effective partnership characteristics as well as their own voices regarding the benefit, challenges, and motivations they have regarding partnership with an academic institution."¹² Their research involved focus groups with 99 community partners in California, including academic institutions located throughout the state that spanned urban and rural settings, research-oriented and liberal arts schools, etc. Data was collected by recording participant responses on large paper, taking notes, and audio recordings, which were then transcribed. To improve integration of the partners into the study, "participants were involved with approving the thematic interpretations, finalizing the reports designed to inform and improve their particular partnership, and the 'meta-analysis' that includes a cross-analysis of all the data generated from all of the focus groups."

Worrall focused on community partners involved with service-learning initiatives at DePaul University. The initial round of data collection included surveys, followed by 40 one-on-one one interviews conducted across 12 organizations. Interviews were transcribed and coded for emerging patterns and themes.

Finally, Stoecker and Tryon's study was motivated by the larger question, "Who is served by service-learning" (p.1). It was conducted as an action research project at the University of Wisconsin-Madison, headed by the authors and performed in conjunction with participating students and NGOs. They conducted 67 interviews, and participating students identified themes based on the research questions. The results were reported in a book, titled *Unheard Voices*¹¹, where each chapter was tailored to a research question and had distinct sets of authors.

Synthesis of the Motivations and Challenges

The three studies highlight perceived motivations, benefits, and challenges among community partners in service-learning programs. Across all three studies, common reasons for community partners to participate in service-learning included: promoting student learning, realizing personal and/or organizational benefits, and building relationships. This is listed in table 1. Sandy and Holland also mentioned social justice as a reason for engagement among some partners. This section will review these findings in more depth.

All three studies placed primary emphasis on community members' dedication to students' learning. Many community organizations see themselves as having education and outreach roles, and their interactions with students helps fulfill their organizational missions. Many partners even see this as the primary reason for the service-learning partnership. Partners also want to prepare students for their future careers. More specifically, Worrall emphasized the desire for the community to teach students about and expose them to diversity while addressing their

misconceptions about the communities of interest, while Bell and Carlson highlighted how some community partners expressed a desire to train students to get involved with the non-profit world. For example, some partners got interested in working for NGOs after doing service-learning in college.

All three studies also found that both the community partners and their organizations benefited directly from student work. For instance, Worrall discussed partners’ appreciation of the ten-week commitment students gave. Since many organizations were largely run by volunteers, the organizations appreciated having students committed during that term. Studies by Worrall and Sandy and Holland mentioned the positive impact of the students’ presence in the community, such as having college students mentor younger community members, thereby providing community members with positive role models and revealing college as a more tangible option. Bell and Carlson also discussed increasing organizational capacity by leveraging student capabilities not otherwise available in the organization, such as web design skills.

Additionally, all of the studies mentioned that students brought new ways of looking at situations that were beneficial to the organization. For example, Sandy and Holland coded students’ different views under “organizational and personal development,” since their views brought a sense of self-reflection to the partners, allowing them to learn from their mistakes and grow as an organization. Bell and Carlson¹³ (Chapter 2 of Stoecker and Tryon’s book) made a similar observation and coded it under “capacity enhancement.” Worrall did not elaborate on this finding, but did indicate that similar themes were commonly mentioned by interviewees.

Each study also discussed the relationship of the campus to the community as being a motivation for partnership. Bell and Carlson discussed how organizations used it as a way to get their name out and get access to other resources. Yet many partners said they often felt pressure to join a partnership because of such resources, since access to professors and research in the organization’s field might not be available if they did not commit to service-learning. Yet Worrall adds that the community image of the university became more positive with service-learning, and Sandy and Holland mentioned that there were potential resources for the community within the relationships.

Some partners also saw participation in partnerships as a sense of responsibility . For instance, Sandy and Holland included social justice as a motivation for some community partners. While this particular motivation was not a common topic, it was discussed at length in a few focus groups.

Table 1 presents a summary of the findings from all three studies, which were used to perform deductive coding of the data collected for the study described in this paper.

Table 1: Synthesis of Motivations from the Literature Review

Code	Motivation relating to:
Student learning	student’s learning.
Organizational benefit	supporting organizational mission.
Personal benefits	professional development within the organization.

Relationship building	the benefits community gains within the partnership.
Social justice	the responsibility of community as a whole.

Methods

This study utilizes a single site case study approach to look at the motivations among advisors and community partners to work with an engineering service-learning program, EPICS. This section gives further details about the theoretical framework for this study, as well as background information about the EPICS program and data collection and analysis procedures.

Theoretical Framework

The guiding principle of the present research is based on a truth- and reality-oriented theory of empirical research. Patton (2002, p.91) describes this theory as “there [being] a real world with verifiable patterns that can be observed and predicted – that reality exists and truth is worth striving for.”¹⁴ This framework impacts the research questions, design and analysis. Given the notion that the “truth” is worth striving for, the question implies that there are truths out there, and through systematic research they can be uncovered. The research question for this study assumes that by asking the participants questions about their experiences, the researcher can discover their true motivations and interests. What the research subjects say is taken explicitly, and without interpreting meanings beyond what is said.

Within this framework there is also an explicit concern about “validity” and “reliability” of the findings. Triangulation of data sources can increase accuracy and improve the credibility of the findings. Talking to multiple stakeholders and reviewing program policy documents allows the researcher to triangulate the findings presented in this paper. While there remains recognition that complete objectivity is impossible to maintain, this framework implies that striving for objectivity is desirable.¹⁵

Program Description: EPICS

The target program for this study, Engineering Projects In Community Service (EPICS), is an interdisciplinary service-learning program at Purdue University where engineering students are teamed with students from across campus to work on projects, primarily for local community non-profit or government organizations. Working with these partner organizations, students might develop an exhibit for a local science museum, perform energy audits of office buildings, create a bike share strategy for a local municipality, or develop software solutions for local government agencies.

In Fall 2011 there were 388 students enrolled in EPICS, and 315 of these (or 81%) were enrolled in engineering. Many engineering students are able to count EPICS as technical electives. In certain departments, such as the School of Electrical and Computer Engineering, students can also elect to take EPICS for capstone design if they are working on a project related to that engineering discipline (e.g., electrical engineering students designing a robotic arm).

Currently, there are around 30 teams in EPICS, each having a different theme. Within each team

there might also be multiple projects, and each project is assigned one project partner from the organization. Sometimes a single individual is the primary point of contact for all projects, while in other instances there are multiple contacts. Students work on the projects for one or more semesters and are assessed through “documented individual accomplishments and learning and skill development per the course learning objectives as well as the team’s accomplishments.”¹⁶

Faculty, administrators, community members, project partners and graduate students can act as advisors for the teams. There are EPICS graduate teaching assistants for the teams as well, who help advise project work, perform higher-level coordination, and grade student reflections and other work. At minimum, the project partner will answer questions that students have regarding the organization. However, the project partner’s involvement with a team may vary considerably based on their own interests and the complexity of the project. Some project partners also opt to serve as advisors for the relevant project team, thereby assuming a role where they are technically reporting to both the EPICS program and the community organization for which they work as a volunteer or paid employee. In other instances, a separate team advisor is involved, with this role often filled by Purdue faculty or other staff members.

Data Collection

In order to determine the motivations of the community partners and advisors, including to find any gaps in awareness or understanding between the partners, advisors, and program staff, a total of 11 participants partook in 45-90 minute semi-formal interviews. Among these, there were five individuals who acted solely as project partners, three that were solely in advisor roles, and two who served dual roles as both project partners and advisors. Additionally, one interviewee was a project design reviewer and former student. This individual was included because she had spent three-and-a-half years as a student in EPICS and continues to be involved in reviewing the work of EPICS teams. While the participants had diverse disciplinary expertise, five had backgrounds in engineering.

The participants for this study were recruited based on a variety of factors, including their commitment to the program, their role in the partnership, and the type of organization they worked with. Additionally, all participants had been involved with EPICS for at least three semesters. According to Dorado and Giles¹⁷, the age of the partnerships helps determine the depth of the partnership, and hence familiar with the program. The different roles of the participants and types of organizations were also selected to get a variety of perspectives on motivations for partnering with EPICS.

The interview questions were determined based on a variety of factors including the research question, previous studies, and interests of the EPICS administration. The interview protocol also addressed three research questions outlined in the first author’s dissertation proposal. However, this paper only reports results from the first question. The interview protocol was created by the first author and reviewed by the second author and EPICS administrators.

After conducting each interview, a memo based on Miles and Huberman’s¹⁸ contact summary sheet was produced. This includes a brief description of the person and the organization, topics discussed relating to the research question, things that stuck out in the interview, any comments

of themes the lead researcher would like to build on, and a section for free thinking. Each interview was then transcribed verbatim, and sent to the participants for member checking.

Analysis

All data analysis was done using a combination of approaches described by Hatch¹⁹ and Braun and Clark²⁰. Hatch outlines a method for conducting a typological systematic analysis, while Braun and Clarke offer a process for thematic analysis. The first step, according to Hatch, involves identifying the initial typologies for the analysis.

In the coding phase of the analysis, each of the excerpts was summarized for main ideas in a summary sheet. At this point, various patterns, relationships, and themes emerged from the data. The lead author developed a coding framework based on a combination of the emergent themes and the previous research. These codes were reviewed with the second author. The transcripts were then uploaded to the Dedoose qualitative data analysis application and coded based on the new set of codes. These codes specifically examined motivation for participating in the partnership. Excerpts based on motivation were exported, and the codes sorted based on potential themes and sub-themes to determine what patterns were supported by the data.

The themes were reviewed and refined by insuring that the excerpts fit well within each theme, as well as by combining themes. Once the themes were determined to adequately describe the data, the whole data set was reread to insure that the themes adequately represented the data set. Special attention was paid to looking for data that potentially disproved or refuted the themes.

Findings

The motivation of all the participants can be placed in three main categories: students, personal reasons, and organizational benefits. There was some variation in themes among individuals who were solely the project partners compared to the other participants, which is described within each of the categories. The following section gives an overview and discussion of the various themes. The next section also compares these findings to previously published results.

Motivations Connected with Students

All of the participants identified student learning as a motivation for being a part of the EPICS program. However, perceptions regarding the program learning objectives and the influence on student's careers varied among participant groups. The objectives of the community partners were largely focused on the learning about their specific organizations, while the advisors had larger educational goals. For the purpose of the program, both the community members and advisors see EPICS impacting the student's careers as engineers. However, the community partners tend to see the influence in a more pragmatic way, by speaking of how EPICS will help students gain experience for future jobs, while the advisors more frequently mention how this experience will make students make morally sound decisions.

Learning Objectives: All of the project partners indicated the importance of students learning about the partner organization. For example, one participant stated that he wanted to offer

students the “experience working with the county government,” while another stated that she wanted students to gain an “appreciation specifically [of] the world of wildlife.” Nonetheless, this focus on learning about the partner organization and its domain of activity was not mentioned by most of the advisors, nor is it listed as a desired learning outcome in the standard EPICS course syllabus. By contrast, most of the participants in the advisor group tended to speak of the learning objectives in broader educational terminology, such as encouraging students to develop the “ability to work with others.” One advisor talked about the student’s learning through the reflection journal, and seeing students reflect on “interpersonal relationships, team dynamics and learning scheduling - a more realistic alignment of their expectations.” Hence, the learning objectives described by the advisors tend to be more consistent with the course syllabus.

Purpose of Education: Another notable theme that emerged was related to the purpose(s) of student learning, albeit with notable differences between how the project partners and other participants saw EPICS influencing students’ careers. Most of the project partners described the EPICS experience as a way for students to learn practical lessons and skill sets that will help them function as an engineer. Describing his motivation for promoting educational outcomes, one participant explained: “The academic world is a lot different than the outside world, and I try to get that point across to them. When you go out into the outside world your boss is going to tell you that the bottom line is the dollar.” And as another participant stated, “I want [the students] to, at the end of the semester, say to themselves or to anyone that listens ‘I learned from EPICS and I think I can be a better applicant to somebody because of this real world experience.’”

Advisors also saw EPICS influencing students’ future careers as engineers, but how they saw this difference was often connected to a larger purpose. For instance, the advisors more often describe EPICS as a way to positively impact the community and develop students as active citizens. For example, one faculty advisor described EPICS as a way to “help the community, and help people who are truly in need.” More generally, there was also a sense that the current educational and societal context has moral deficits that EPICS helps address. As one participant stated, “it’s good to see people still care about things in this texting, individualistic society that we have.”

Advisors also perceived the EPICS experience as morally impacting the students in their roles as engineers. For instance, one advisor hoped students gained “[a]n appreciation for the fact that they are becoming a contributing member of a community, either locally or even better globally, ... especially, in the roles of engineers... and the decisions they make.” The moral dimensions of engineering were particularly linked to design decisions. As another advisor explained, students who were making design decisions involving a choice between speed and accessibility might help them be more considerate while making design decisions: “so it can open it up to more people, even if it is slower, maybe [speed] is not what your criteria should be. It should be, how many people at the facilities can do that task, whereas before they couldn’t do it at all.”

Motivations Connected with Personal Benefits

Respondents identified a number of personal benefits associated with being part of a partnership. These fell into two main thematic categories: personal enjoyment and professional enhancement.

Personal Enjoyment: All of the participants described the enjoyment they experienced working with students and the program. Participants described a sense of joy being around the younger generation, contributing to their education, and gaining a deep sense of appreciation for the dedication and intellect of the students. As one project partner clearly stated, “I like the fresh ideas. I like the potential that we have in influencing [the students] to think about something outside of their career and making money and I guess - it’s just good to be around youth.”

Professional Enhancement: As a second thematic category, many of the advisors saw their experience in EPICS adding to their professional development, especially by helping them build skill sets and by giving them richer experiences that enable growth. For example, one advisor credits EPICS with “help[ing] me develop leadership skills, organizational skills, [and] interpersonal relationship [skills].” For a number of participants, EPICS also offered a space for them to express their deep personal interests. One of the participants, who was both an advisor and a project partner, had a great deal of appreciation for the “intellectual stimulation” and the “think-tank” atmosphere of EPICS. He found that brainstorming and “bringing those thoughts to a reality” made the experience incredibly enjoyable. Overall, he described the experience as “one of the most rewarding experiences of my time at Purdue.” Another advisor saw EPICS as a way to follow her passion to “take learning and use that learning to make a difference not only in the lives of the students but also in the lives of people in the community.” However, one identified challenge regarding professional development was a perception that the university did not adequately recognize the importance of the program, which meant many faculty were reluctant to get involved.

Organizational Motivations

An organization benefits from a partnership when EPICS helps them fulfill their mission. The interviews revealed two main ways this was accomplished, namely through products/solutions and the partnership more generally. These themes were identified primarily by the project partners and the individuals who were serving in dual roles as project partner and advisor.

Products: The products or solutions developed by EPICS teams are generally useful for the partner organizations. Many of the products provide extra income to the organizations or give other kinds of direct benefits. The extra income streams have been created through saving energy, opening up access to grants, providing a service that would otherwise cost money, creating a product that generates money, or simplifying a task that increases efficiency. One example of an increase of income is from an EPICS group that was able to get a large grant, over one hundred thousand dollars, to work on a project for an organization. This same group was then able to directly benefit the organization by offering a workshop to volunteers throughout the state.

Yet not all of the EPICS projects are successful, and frequently identified challenges include products or solutions that take too much time to create, students who are too technically oriented, and too much focus by the program and teams on process over product. In fact, products needed within a certain timeframe were often not completed in time, as one interviewee explained: “a lot of times [the students] will be developing a project and by the time it is finished we may not be doing that job any more.” Other projects are done with too much focus on technical issues, and

without students knowing their own limits. One respondent noted that “I have to get them off the track that the more engineered, or the harder, the more complicated, the device is the better.”

Partnerships: In two of the interviews, the partnership itself was viewed as a way to meet the needs of the organization. For example, an animal advocacy organization had education of students as a primary mission, and saw the partnership as enhancing the “credibility” of their organization. Another participant who was in the advisor/project partner role for an agency that provides children with educational science materials saw the partnership as a way to build bridges and possibly limit competition. More specifically, the participant articulated that Purdue University might start doing things similar to what the organization is doing, and the partnership with EPICS provides a way to assist the university rather than be in competition with it.

Discussion

This paper reports results related to one research question and one program from a larger study involving three cases and a wider range of questions and themes. Motivations are the primary focus here, but challenges are also receiving additional attention, particularly through data collection and analysis at the other sites.

The findings from this study were found to be largely consistent with motivations for partnerships as reported in the wider service-learning literature. All the themes within the literature review, except social justice, were evident in the EPICS study. Social justice as a motivation was also not mentioned in Worrall and Tryon and Bell studies. The motivation of relationship building was moved under organizational benefits, since the partnership allowed the organization to better meet their mission. Table 2 below compares the categories and sub-themes from the literature review and research findings.

Table 2: Synthesis of Motivations from the Literature Review and Findings

Motivations from Literature Review	Motivations from this Study
<ul style="list-style-type: none"> • Student learning • Personal benefits • Organizational benefits • Relationship building • Social justice 	<ul style="list-style-type: none"> • Students <ul style="list-style-type: none"> ○ Learning objective ○ Purpose • Personal benefits <ul style="list-style-type: none"> ○ Personal enjoyment ○ Professional growth • Organizational benefits <ul style="list-style-type: none"> ○ Products ○ Partnerships

Conclusion

Based on these results, it is worth concluding with a discussion of how the findings relate to the concept of reciprocity and suggest best practices for new and existing programs. As Jacoby⁴ argues, service-learning is more than a pedagogy, and should also be viewed as a philosophy that values reciprocity and “implies a concerted effort to move charity to justice” (p.5). To evaluate

and potentially enhance reciprocity, it is important to investigate different motivations of the project partners and advisors, including in relation to the program's larger goals and objectives. One main difference highlighted in this paper centers on student learning, where the project partners tend to emphasize the importance of learning about the partnered organization, while this was not mentioned by the advisors or stated in policy documents. Being more explicit about the importance of students learning about partner organization would be one way for service-learning programs to improve their alignment with the motivations of the partners.

Sandy and Holland⁹ also used their findings to develop a list of recommendations for service-learning programs based on common challenges found across service-learning programs. However, the present study suggests that such best practices might be adjusted or even irrelevant in an engineering project-based service-learning program such as EPICS. For example, the recommendation to "*Involve faculty more directly*" and "*Address the hours divide*" are inappropriate to EPICS. Sandy and Holland recommend that faculty provide additional information to the community partners, since the community partners were often ill-informed about the service-learning course expectations. This was not a challenge within the present study, since the community partners often had a clear expectation within the partnership, and the program coordinators contacted the partners regularly. Also, there was no tracking of volunteer hours, which is a common practice outside of engineering that is often seen as an impediment for community partners. Although one organization did count hours for other service-learning students, she saw the nature of EPICS to be fundamentally different enough not track the hours of the EPICS students.

This study also presents a framework and themes for investigating the perspectives and experiences of community partners in a well-established engineering service-learning program. By bringing out the community's voice in the understanding and outcomes of the program, we are able to include more of the people who are directly impacted by engineering service-learning. The framework can be used in future studies to see how generalizable the community outcomes are, and possibly turned into a survey so programs can have regular feedback on how programs are impacting and aligned with community partners and organizations.

In the next stages of this research, the first author will expand the study to include two other well-established engineering community engagement programs, including to examine how the structure of the programs influence the partnerships and the various roles that projects play.²¹

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