



The Role of Public Libraries in the Development of
Smart Cities and Communities:

Results from a National Public Library Survey

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This project was supported by IMLS Grant No. LG-96-17-0144-17 awarded by the Institute of Museum and Library Services.

The opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Institute of Museum and Library Services.

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Executive Summary

This report summarizes the results of a national survey of public libraries which aimed to understand their perceptions of smart cities and communities¹, their role in the development of smart communities, as well as the benefits, costs, challenges, success factors and expected future contribution of public libraries to the development of smart communities.

This survey is part of the Center for Technology in Government's (CTG UAlbany) research project, "Enabling Smart, Inclusive, and Connected Communities: The Role of Public Libraries"², implemented in partnership with the American Library Association (ALA)'s Center for the Future of Libraries and funded by the Institute of Museum and Library Services (Grant No. LG-96-17-0144-17).

The survey explores how public libraries understand the concept of smart city/community as well as their present and future contribution in the development of smart communities. It was designed based on a review of existing literature, a current practice report and four case studies conducted by the CTG UAlbany research team. This report summarizes the responses of 1,260 public library professionals who participated in the survey in 2020.

The survey questions were designed in a way to be applicable for all public libraries, including public libraries that already collaborate with other organizations in the development of smart communities, public libraries that contribute to smart communities' development by themselves without collaboration and public libraries who currently do not participate in the development of smart communities.

In terms of the characteristics of the public library survey respondents,

Characteristics of Survey Respondents and Public Libraries (Top 1)
Respondents: Position: Public libraries director (86%) Average years of work experience: 11
Public libraries: Time of built: 1900-1950 (52.19%) Service outlets: single central library (75.23%) Community environment: rural (37.3%) Population served: <5000 (37%) Staff: 1-10 full-time (62%), part-time (70%), volunteers (36%) Annual budget: 0.1-0.5 million dollars (36%) Budget for technology: <10% of annual budget (49.27%) Technologies: <ul style="list-style-type: none">• Public access computers:<ul style="list-style-type: none">○ 1-10 (53.46%)○ all with internet connection (93.03%)○ Internet speed: 40-100 Mbps (34.07%)○ one to three years old (40.18%)• Wi-Fi connection: >99%• Other types of technologies: color printers (86%), scanners (83%)

¹ For the rest of the document, the term "smart community" will be used and will be inclusive of both cities and other communities.

² Project website: <https://www.ctg.albany.edu/projects/imls2017/>

the majority (86%) were public library directors³, and on average, they had 11 years of work experience. About half of them (52.19%) came from public libraries that were established between 1900-1950. Most of them (75.23%) serve in libraries that had only one central location. About 37% of the public libraries are located in rural areas and serve small communities. More than half of the public libraries (62%) have limited staff (less than 10 full time staff). 36% of them have an annual budget of USD 0.1-0.5 million. About half of them (49.27%) devote less than 10% of their annual budget to technology improvement. About half of the public libraries (53.46%) provide 1- 10 public access computers and about 40% of their computers are one to three years old. Most of the computers had Internet connections (93.03%) and 34.07% of the libraries had an Internet speed between 40 to 100 Mbps. Over 99% of the public libraries had Wi-Fi connection. Color printers (86%) and scanners (83%) were the most mentioned technologies that public libraries provided for public use.

In terms of the concept of smart city/community, public libraries have adopted a comprehensive view. Over 70% of the public libraries think that a smart city/community improves access to different kinds of resources, such as advanced technology and

The Concept of Smart City/Community

Characteristics of a smart city/community (Top 3):

- Improves access to different kinds of resources: advanced technology, information in health, education, etc. (81.76%)
- Improves residents' quality of life (79.43%)
- Improves residents' digital literacy (75.50%)

Awareness of smart city strategy/plan:

- Public libraries that are aware of the smart city initiative in their communities (15.92%)

Public Libraries in the development of Smart Communities (Top 1)

The role

- They help improve residents' digital literacy and skills and enable them to better utilize technology for better decision making and life quality improvement. (89.63%)

Participation

Collaboration:

- Public libraries contribute to the development of smart cities and communities without collaboration (51.05%)
- Most collaborated organizations (Top 3):
 - local government (28.87%)
 - local nonprofit organization (24.74%)
 - school district (16.49%)

Programs and services:

- Free access to high-speed Internet, public access computers and advanced technology (e.g., 3D printers, laser cutters, vinyl plotters, computer numerical control (CNC) routers, etc.). (93.40%)

Benefits

- For residents: Free access to high-speed Internet and different kinds of technologies. (93.64%)
- For the community: Improving community connectivity through libraries serving as a physical or virtual hub. (76.15%)
- For public libraries: Staying relevant. (91.24%)

Costs: Buying and updating technology. (90.69%)

Challenges: Limited budget. (80.97%)

Success factors: Public libraries provide a welcoming environment that helps with resident engagement. (81.19%)

³ In general, we provide the response to each question with the highest frequency in the survey.

information in health and education (81.76%), improves residents' quality of life (79.43%), and improves residents' digital literacy (75.50%). Among all the public libraries, only a small portion (15.92%) is aware of the smart city strategies in their communities.

In terms of the role in the development of smart communities, public libraries view themselves as serving multiple functions. However, some libraries state that they are not familiar with the term smart city/community. Even though they are playing one or more of the roles indicated in the survey options, some public libraries do not link them to contributing to the development of smart communities. The most mentioned role of public libraries in developing smart communities is that they help improve residents' digital literacy and skills and enable them to better utilize technology for better decision making and quality of life improvement. (89.63%)

More than half of public libraries (51.05%) indicate that they are contributing to the development of smart communities by themselves, that is without collaborating with other organizations. For the public libraries that collaborate with other organizations, local governments (28.87%), local nonprofit organization (24.74%) and school districts (16.49%) are the top three most mentioned partners. Public libraries are contributing to smart communities through various programs and services. The most mentioned program or service (93.4%) is free access to high-speed Internet, public access computers and advanced technology (e.g., 3D printers, laser cutters, vinyl plotters, computer numerical control (CNC) routers, etc.).

The participation of public libraries brings benefits for residents, the community, and public libraries themselves. The most mentioned benefit for residents is that they can enjoy free access to high-speed Internet and different kinds of technologies (93.64%), the most mentioned benefit for the community is improved community connectivity through libraries serving as a physical or virtual hub (76.15%) and the most mentioned benefit for public libraries is staying relevant (91.24%). In addition to that, public libraries also experience costs and challenges when they participate in the development of smart communities. The most mentioned cost is buying and updating technology (90.69%), and the most mentioned challenge is limited budget (80.97%). Most public libraries (81.19%) think that providing a welcoming environment that helps with resident engagement is the most important key success factor for public libraries to contribute to the development of smart communities.

In the future, public libraries are interested in becoming more involved in the development of smart communities. 61.31% of them would like to start or continue to provide free computer training and classes at various levels (e.g., basic: set up your smart phone, medium: accomplish a task online; advanced: create models using 3D printer, etc.). 62.07% of them would like to be more active in building partnerships to support innovation in designing and delivering new programs and services. They expect that their increased involvement in the development of smart communities in the future will bring benefits for residents, the community and public libraries themselves. The most mentioned potential benefit for residents is improved digital literacy (78.71%); the most mentioned potential benefit for the community is bridging the digital divide with open and free access and training of technologies for all community members (74.88%), and the most mentioned potential benefit for public libraries is staying relevant (83.74%). In the future, public libraries also think that they will incur different costs and challenges when contributing to the development of smart communities. The most mentioned potential cost is buying and updating technology (83.08%), and the most mentioned potential challenge is limited budget (90.64%).

Future Development (Top 1)
<p>Future participation: Free computer training and classes at various levels (e.g., basic: set up your smart phone, medium: accomplish a task online; advanced: create models using 3D printer, etc.). (61.31%)</p> <p>Strategies: Actively build partnerships to support innovation in designing and delivering new programs and services. (62.07%)</p> <p>Potential benefits</p> <ul style="list-style-type: none"> • For residents: Improved digital literacy. (78.71%) • For the community: Bridging the digital divide with open and free access and training of technologies for all community members. (74.88%) • For public libraries: Staying relevant. (83.74%) <p>Potential costs: Buying and updating technology. (83.08%)</p> <p>Potential challenges: Limited budget. (90.64%)</p>

1. Introduction

This survey is part of the Center for Technology in Government’s (CTG UAlbany) research project “Enabling Smart, Inclusive, and Connected Communities: The Role of Public Libraries,” implemented in partnership with the American Library Association (ALA)’s Center for the Future of Libraries and funded by the Institute of Museum and Library Services. The project, and this survey, aims to better understand the role of public libraries in the development of smart communities, as well as the benefits, costs, challenges, success factors and expected future contribution of public libraries to the development of smart communities.

This report provides a descriptive analysis of the survey responses as well as a qualitative analysis of the respondents’ comments. The survey was administered in two

rounds. In the first round, the survey was distributed to 8,230⁴ public library directors across the United States through SurveyMonkey email invitations from October 4th to November 30th, 2020. In the second round, which took place between December 2nd, 2020 to January 15th, 2021, we shared the survey link with library associations across the United States and asked them to share it with their public library members on our behalf from (See Appendix I for detail).

The CTG UAlbany research team used the survey results as one of the inputs to design an Opportunity Agenda and Roadmap Report as well as a Public Libraries in Smart Cities and Communities Toolbox, which have the goal of supporting public libraries in their efforts to become key players in the development of their smart communities. The survey results may also help other organizations and city stakeholders to better understand the role that their public libraries are playing or can play to contribute to the development of smart communities and include them in their implementation of the smart city/community initiatives. These results might also be of interest to both researchers and practitioners involved in similar initiatives.

2. Demographic Information of Survey Respondents

In this section, we summarize the respondents' demographic information, including their position and average work experience.

As Figure 1 shows, the survey was mostly filled by the directors of public libraries (86%). Less than 3% of the respondents are branch managers, less than 2.5% of the respondents are department heads, about 4% of the respondents are librarians and the rest are serving at different positions at the public library, such as administrative members and library support staff.

Among the respondents, their average work experience was about 11 years and more than 30% of the respondents has between one to five years of work experience. 5.35% of them have been working at their public libraries for over 30 years, 3.76% of them have been at their public libraries for less than one year.

⁴ Among this, 495 email addresses are invalid and have been replaced with updated email addresses, the survey invitations were sent through direct emails.

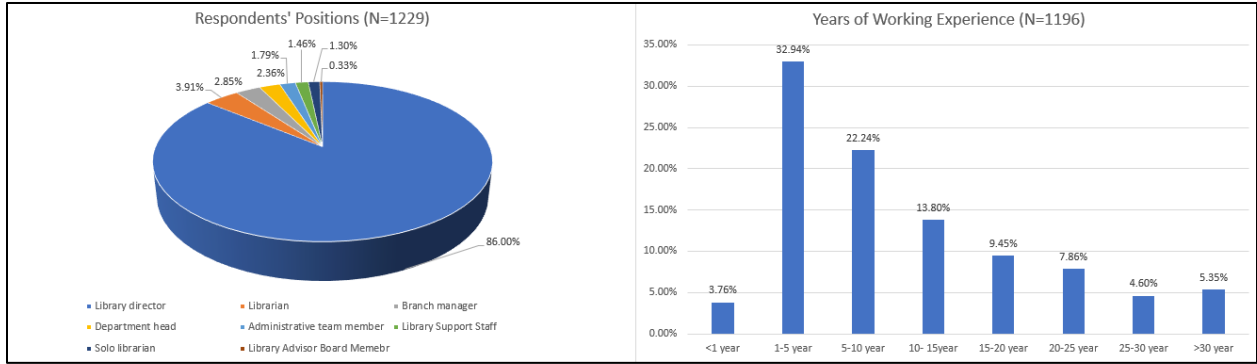


Figure 1. Demographic Information of Survey Respondents

3. Characteristics of Public Libraries

In this section (Figure 2-13), we summarize the characteristics of public libraries that participated in our survey, including the general information of the public libraries, namely the year of establishment, the number of service outlets, LOCALE code, population served, size of service areas, number of staff, budget, and specific information about technologies in public libraries, namely the number and age of public accessed computers, Internet speed, Wi-Fi___33 and other technologies offered by the public libraries.

More than half of the public libraries (52.19%) were established between 1900 and 1950, whereas 2.45% of the public libraries were established after 2000.

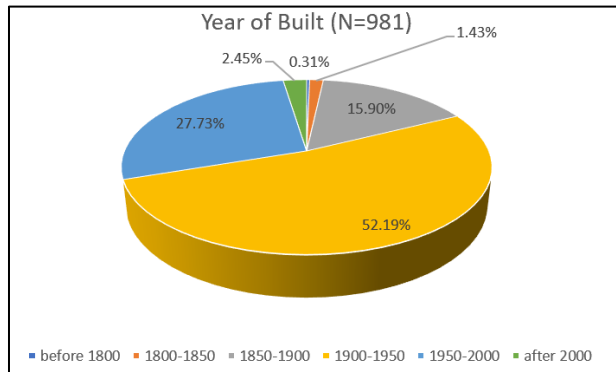


Figure 2. Public Libraries' Year of Built

Over 75% are single central libraries with no other branch libraries or bookmobiles, about 7% are one central library with multiple branch libraries, and around 5% are one central library with one branch library.

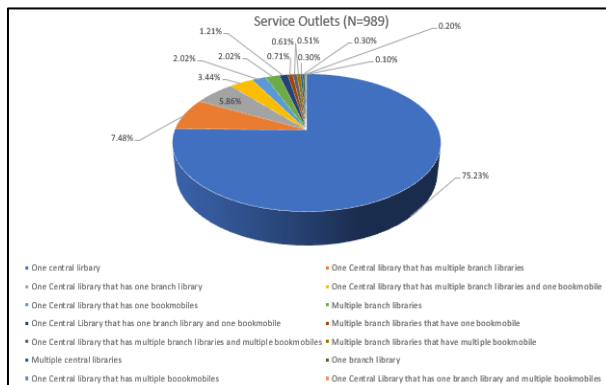


Figure 3. Public Libraries' Service Outlets

38% of the public libraries are located in rural areas, about 30% are in towns, about 25% are located in suburban areas, and only 8% are located in cities⁵.

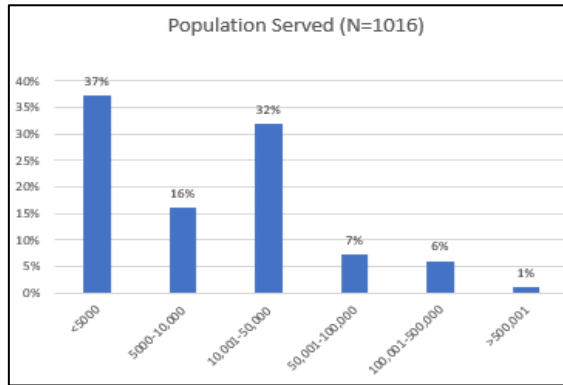


Figure 5. Population Served by the Public Libraries

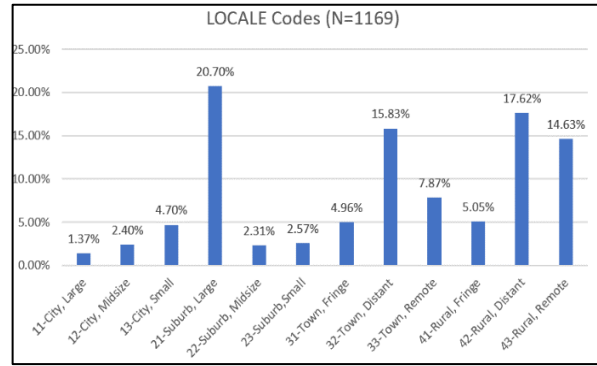


Figure 4. Public Libraries' LOCALE Codes

About 40% of public libraries serve small communities with populations less than 5,000, and less than 15% of the public libraries serve communities with populations above 50,000.

About 30% of the public libraries serve an area smaller than 20 square miles and 30% of them have a service area larger than 100 square miles.

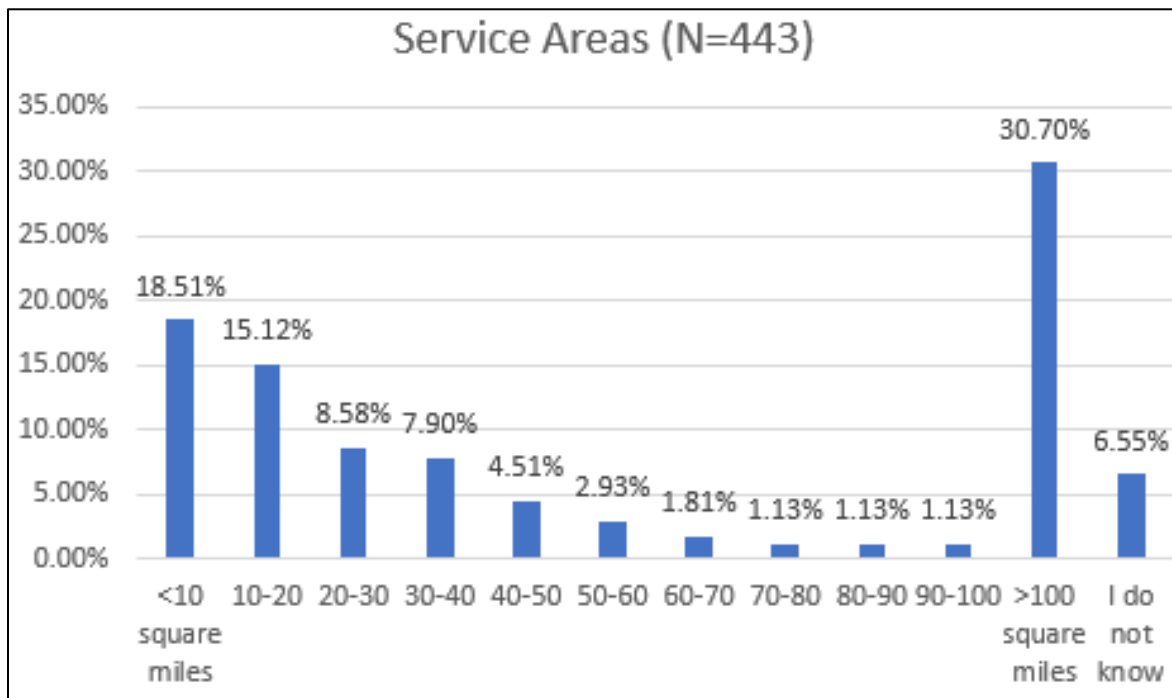


Figure 6. Service Areas of Public Libraries

⁵ According to the World Bank, Cities have a population of at least 50,000 inhabitants in contiguous dense grid cells (>1,500 inhabitants per km²). Towns and semi-dense areas have a population of at least 5,000 inhabitants in contiguous grid cells with a density of at least 300 inhabitants per km². <https://blogs.worldbank.org/sustainablecities/how-do-we-define-cities-towns-and-rural-areas>

Most public libraries have a limited number of staff. About 80% have less than 10 full time employees, part-time staff or volunteers. Due to COVID-19, the shortage of public libraries staff got even worse with many public libraries losing a great number of part-time staff and volunteers that help deliver programs and services and address community needs.

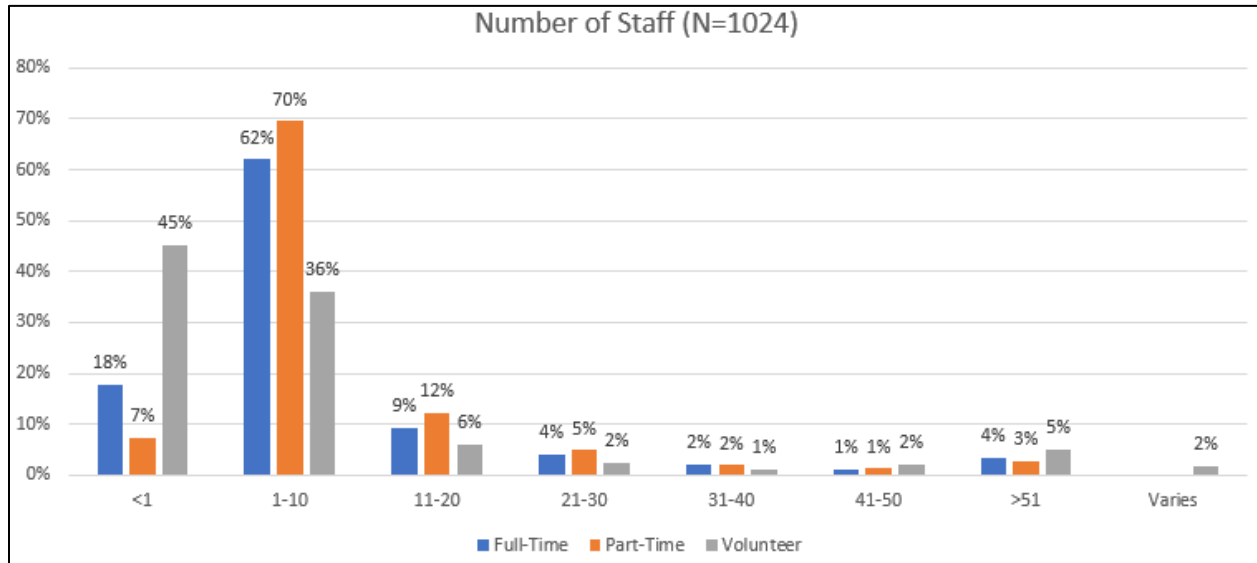


Figure 7. The Number of Public Libraries' Staff

Over 60% of public libraries have an annual budget lower than USD 0.5 million, and some of them also indicate that the pandemic will have a negative impact on their budget in the coming years.

The majority of public libraries devote only a small portion (less than 20%) of their budget for their technology improvement, including purchase and upgrade of their technologies. About 50% of them have less than 10% of their budget designated for the development of their technologies.

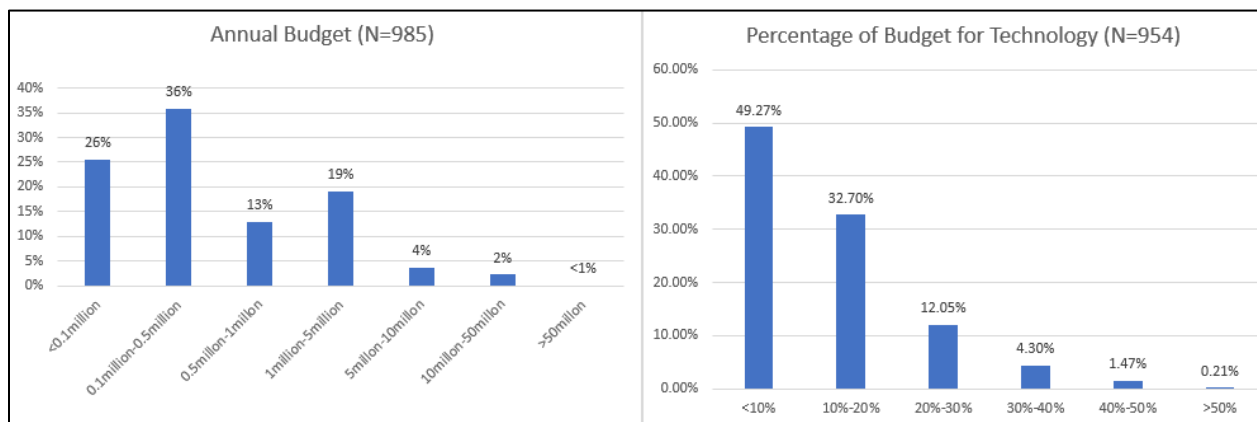


Figure 8-9. Public Libraries' Annual Budget and Budget for Technology

Over half of the libraries have 10 or fewer computers for public use. Among the public libraries, over 90% of them have all their public access computers connected to the Internet. Among all the public accessed computers, about 12% of the computers are brand new or less than one year old. Forty percent of the computers are one to three years old. Forty percent of the computers are one to three years old.

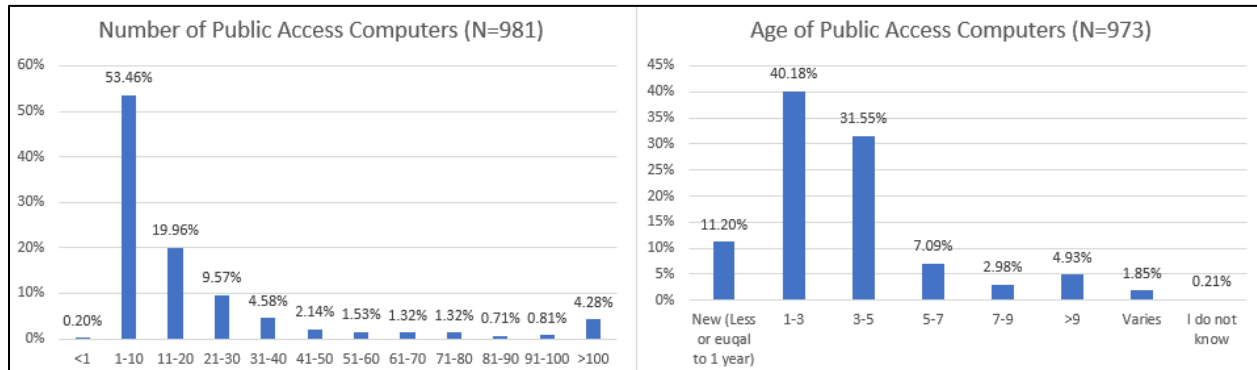


Figure 10. The Number and Age of Public Access Computers

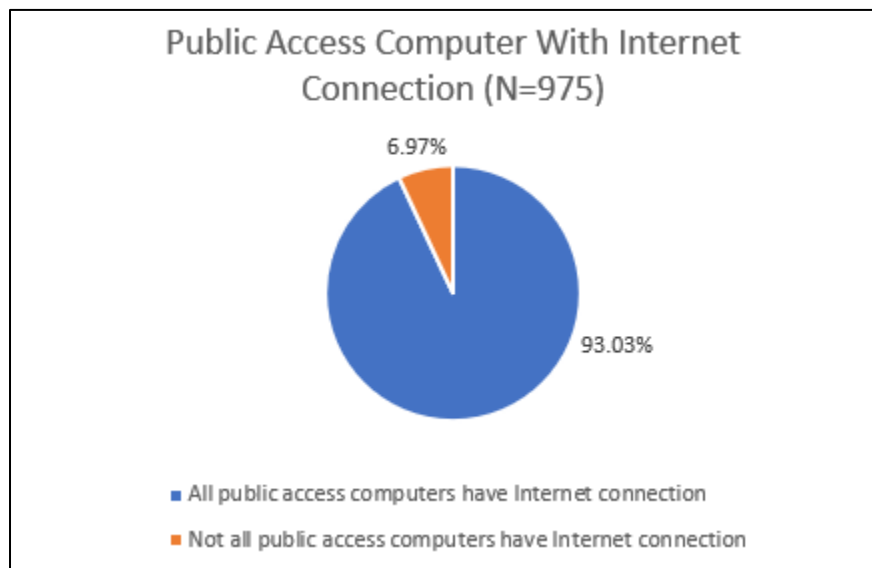


Figure 11. Internet Connection of Public Access Computers

Over 70% of public libraries provided information about their Internet speed. The Internet speed in about 30% of them ranges between 40mbps and 100mbps. The rest of public libraries either respond with the type of Internet they have or indicate how fast they think their Internet speed is. In addition, 1.3% of public libraries indicate that the Internet speed varies among branches and about 12% respondents do not know the speed of the Internet connection at their public libraries. One with one exception, all of the public libraries that participated in our survey had Wi-Fi___33 access publicly available.

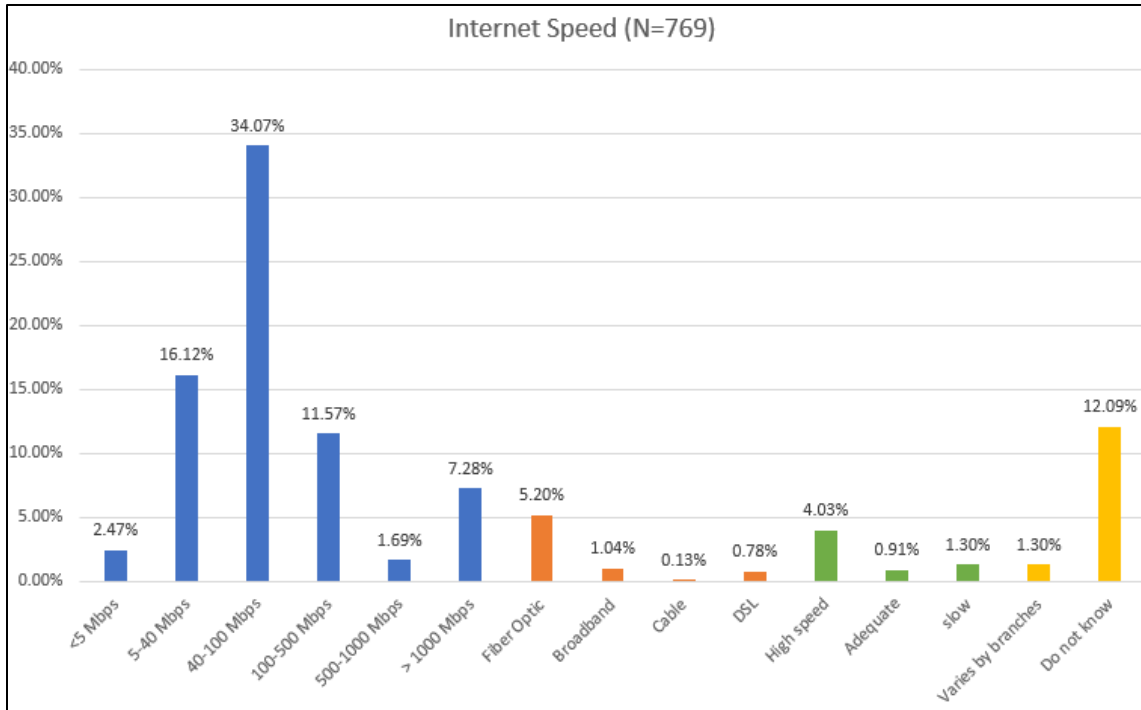


Figure 12. Public Libraries' Internet Speed

Besides public accessed computers, Internet and Wi-Fi connections, public libraries also provide different types of technological devices for public use. For example, over 80% of them provide color printers and scanners. Around 40% of them provide early learning technologies and mobile computer devices.

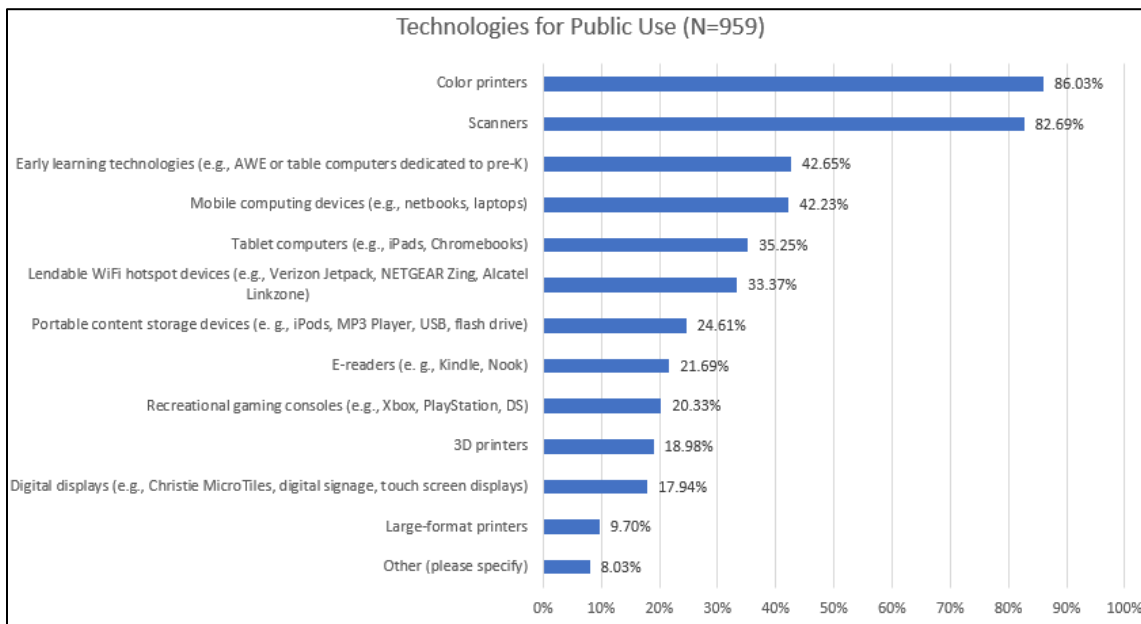


Figure 13. Public Libraries' Technologies for Public Use

4. Public Libraries' Perception of the Smart City/Community Concept

Public libraries have adopted a comprehensive view on the concept of smart city/community (See Figure 14). Over 80% of the public libraries think that a smart city/community is about improving access to different kinds of resources, such as advanced technology, health information and education. Over 70% of them think that a smart city/community means adopting a comprehensive view of the city/community and implementing different types of initiatives, to improve residents' digital literacy (75.50%) and quality of life (79.43%), as well as to make the community more connected and safer (73.81%). Less than half of the public libraries think that a smart city/community is related to the intensive use of technologies.

According to the additional comments from the public library responses, they think that having universal and reliable access to broadband and free Wi-Fi through the community is very beneficial to their communities.

Respondents see making Wi-Fi available to all residents, helping them better understand new technologies and encouraging residents to utilize the available technologies as key benefits that they provide to their communities. Connectivity is a big issue that needs to be addressed, especially in rural communities and public libraries have an important role to play in this respect.

Among the participants of our survey, over 84% are not aware of the smart city initiatives/strategies in their communities.

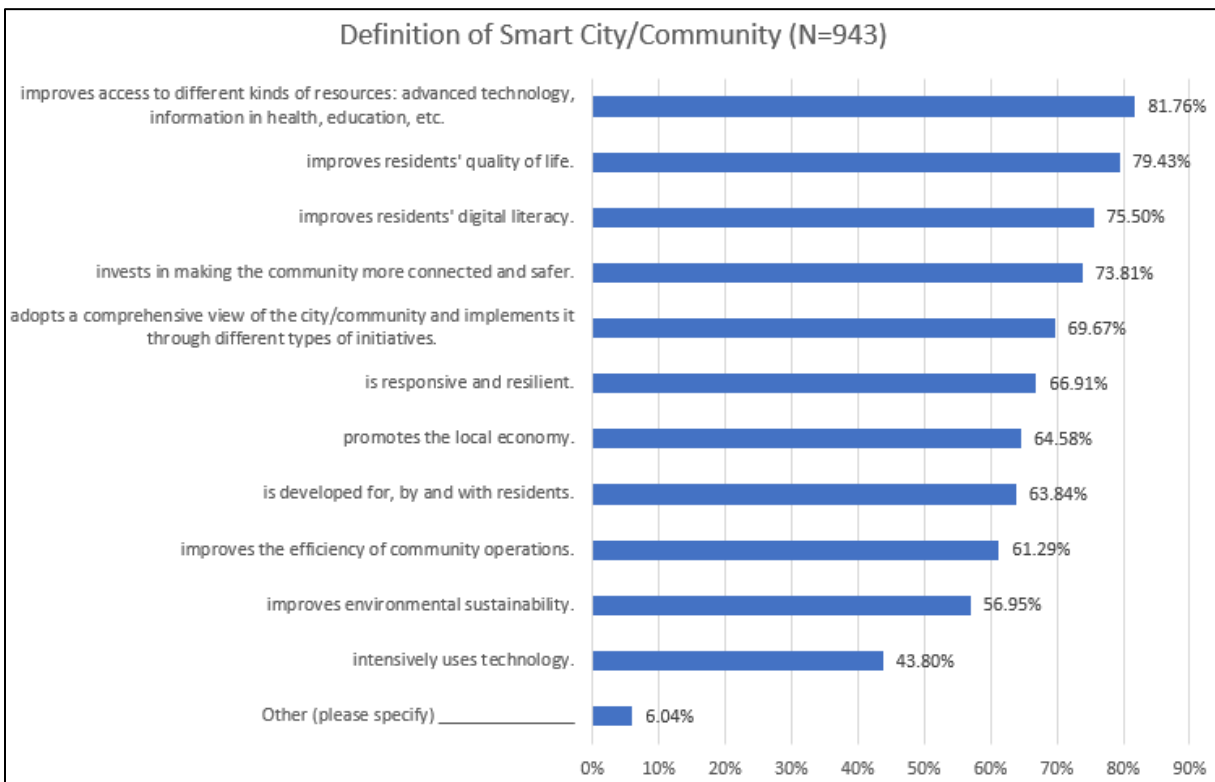


Figure 14. Public Libraries' Perception of Smart City/Community

5. Public Libraries' Role in the Development of Smart Communities

Almost all public libraries (99.45%) view themselves playing different roles in the development of smart communities (See Figure 15). The majority of public libraries think they help improve residents' digital literacy and skills and better utilize technology for better decision making and life quality improvement (90%); help bridge digital divide (86%); and serve as a trusted public platform offering various resources that encourage and support residents' engagement, innovation and collaboration (85%). Very few public libraries (less than 1%) think they play no role in the development of smart communities.

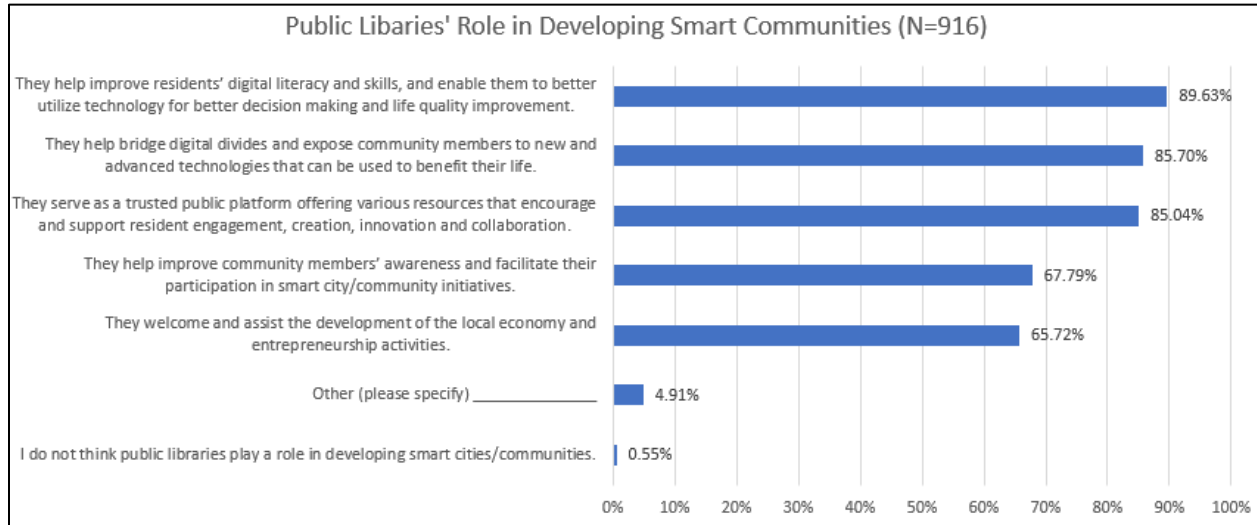


Figure 15. Public Libraries' Role in the Development of Smart Communities

According to the additional comments from public libraries, some of them are not familiar with the term smart city/community, even though they are playing a role as indicated in the survey options, they do not link that to their contribution to the development of smart communities. There are also respondents who think that local governments should better recognize/understand the roles that public libraries play in the development of smart communities and should include them at the early stage of the development of smart communities.

6. Public Libraries' Current Participation in the Development of Smart Communities

In this section, we report how public libraries are currently participating in the development of smart communities, including programs and services, collaborations, benefits, costs, challenges, and success factors.

6.1. Programs and Services

Public Libraries participate in the development of smart communities by providing different kinds of programs and services to their community residents (Figure 16). The most mentioned programs and services are free access to high-speed Internet, public access computer and advanced technology (93.4%), digital literacy and digital skills program (76.1%), services for underserved communities (73.61%), providing space for citizen engagement (68.62%) and workshops that help raise awareness and improve discussion about community issues (53.52%).

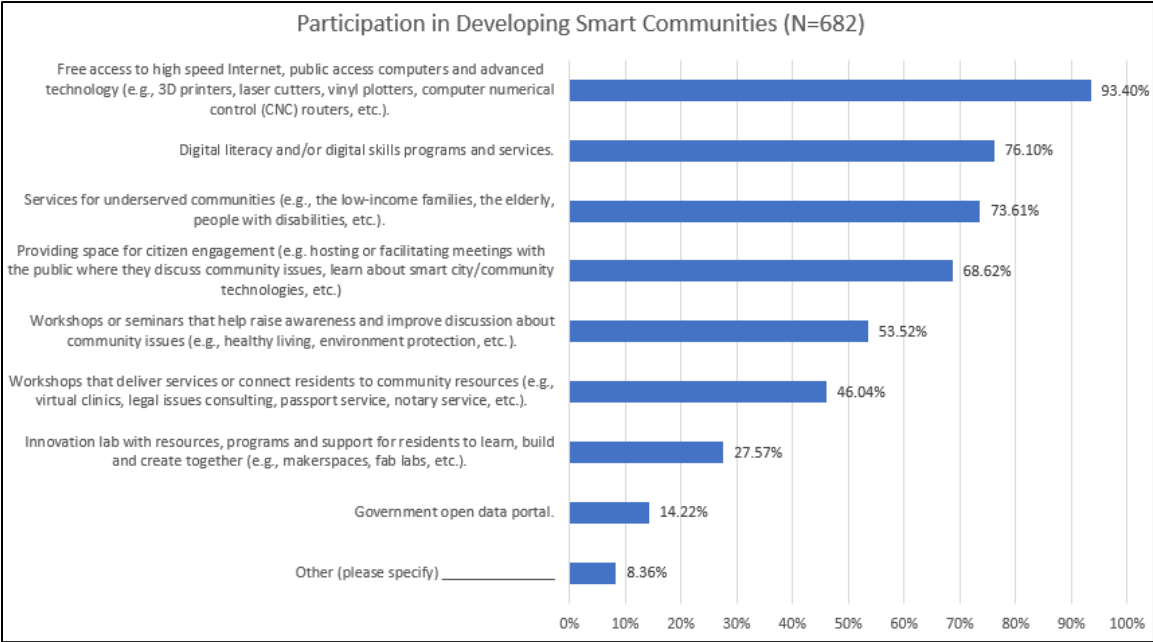


Figure 16. Public Libraries’ Participation in the Development of Smart Communities

From the additional comments, we know that some public libraries think that some non-technology related programs and services can also contribute to the development of smart communities, such as pre-school education, after school programs, programs and services dedicated to children and youth development. Some public libraries also indicate that they are working on building transformation to expand their services and increase space for interaction and engagement, etc. However, most of them also mention that due to the pandemic, many library programs and services were forced to go virtual or were placed on hold.

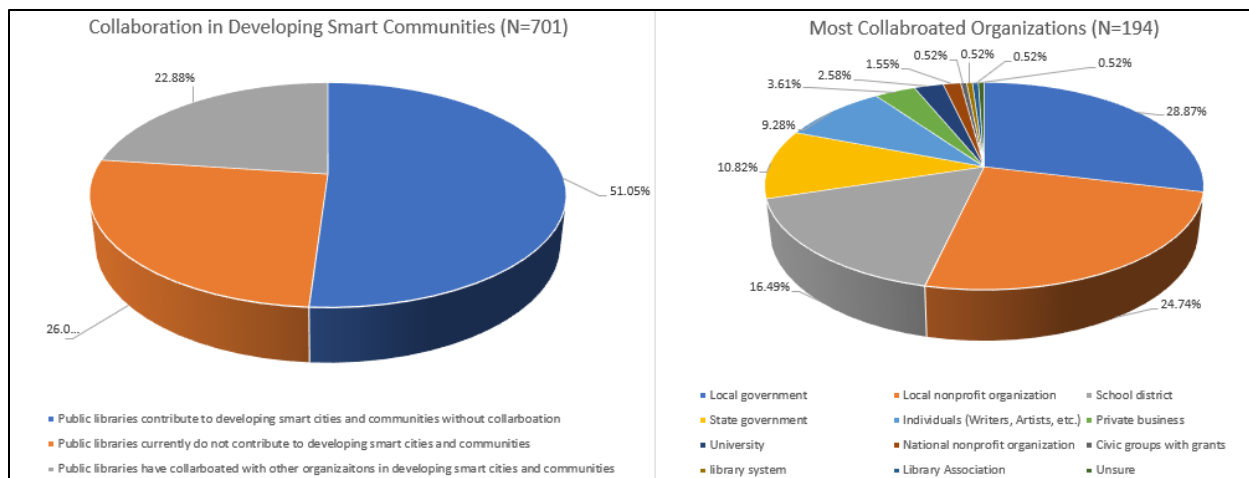


Figure 17. Public Libraries' Collaboration in the Development of Smart Communities

As figure 17 shows, more than 50% of the public libraries are contributing to the development of smart communities individually, without collaborating with other organizations. About 23% of the public libraries are collaborating with other organizations in the development of smart communities. Local governments (28.87%), local nonprofit organizations (24.74%) and school districts (16.49%) are the top three organizations that public libraries have been collaborated with in the development of smart communities. The rest of the public libraries (26%) do not think they are contributing to the development of smart communities.

6.2. Benefits

All the respondents think that the participation of public libraries in the development of smart communities is beneficial for residents, communities and public libraries themselves in different ways (See Figure 18-20).

Among the benefits, more than 60% of the respondents think that through public libraries' participation in the development of smart communities, residents can enjoy free access to high-speed Internet and different kinds of technologies (93.64%), therefore increasing digital inclusion, and feel safe and comfortable to get together at public libraries to communicate and collaborate on creation and innovation (79.01%). They help residents obtain hands-on experience with various kinds of technologies (61.37%), improve digital literacy (69.95%) and increase community engagement and satisfaction (61.05%).

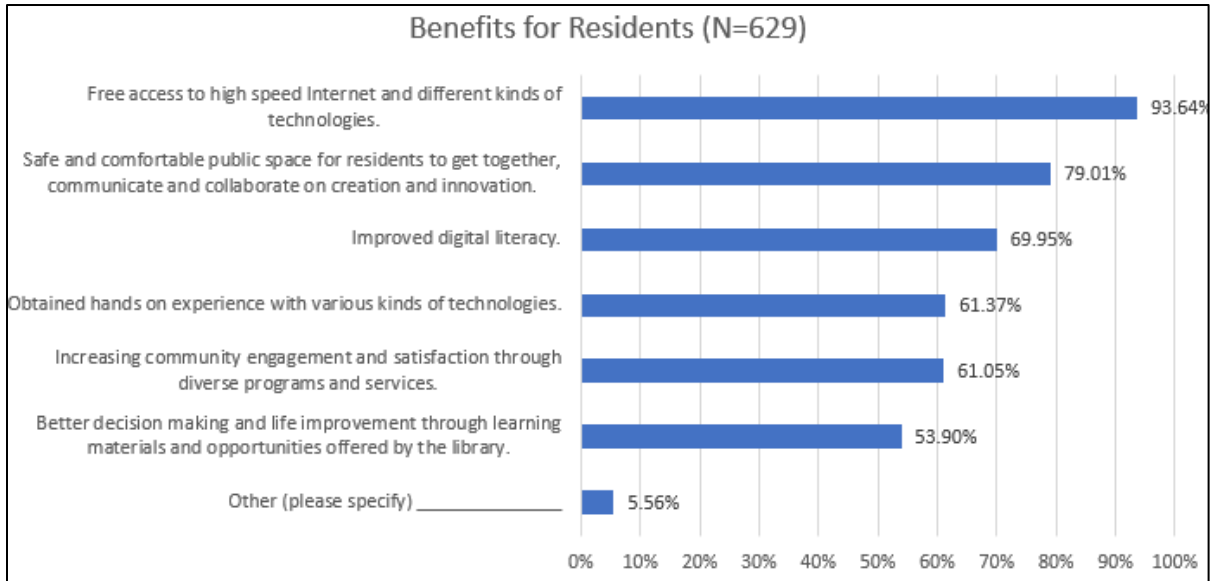


Figure 18. Benefits for Residents

About the benefits to communities, over 70% of the respondents think public libraries' participation in the development of smart communities helps improve community connectivity (76.15%), bridges digital divides within the communities (75.82%), and better satisfies community needs (73.68%). More than 50% of the public libraries also think they are making the residents smarter so that the community becomes smarter. There are other benefits for communities that are less mentioned by public libraries, such as increasing technological innovation (34.05%), increasing workforce development and local economic development (41.45%) and boosting entrepreneurship within the community (26.15%).

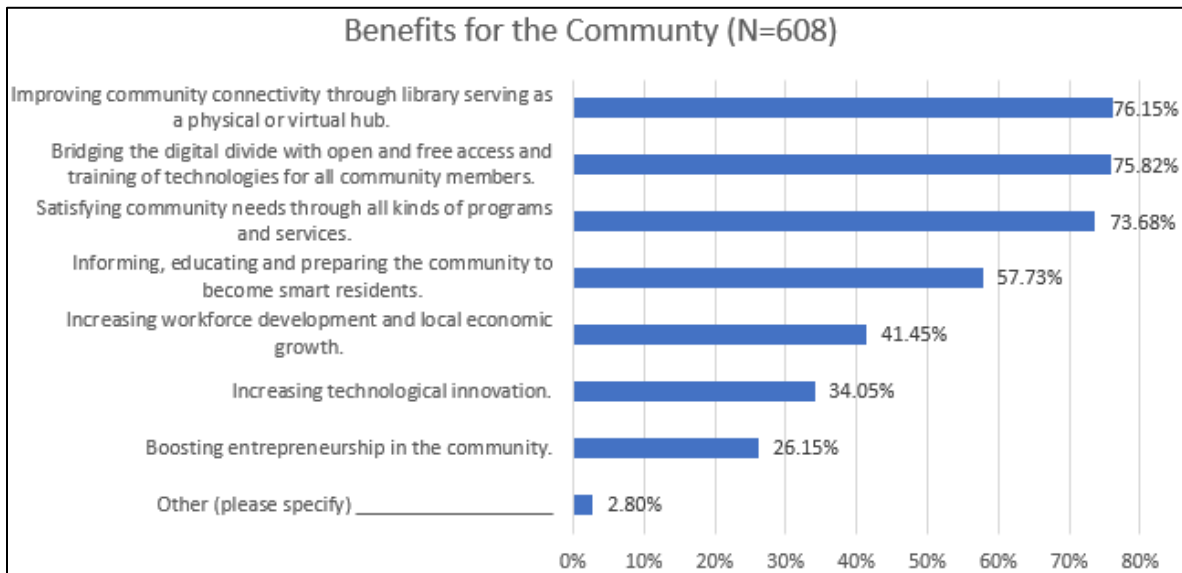


Figure 19. Benefits for the Community

Among the benefits for the libraries themselves, over 90% of the public libraries think that participating in the development of smart communities help public libraries stay relevant to the community. About half of the public libraries also think that participating in the development of smart communities helps public libraries attract more users (60.17%), obtain additional support from the residents (49.92%), enable library transformation (47.93%), and connect with more partners in designing new programs and services (47.93%). Maintaining or increasing the library’s budget is the least mentioned benefit for public libraries (37.02%).

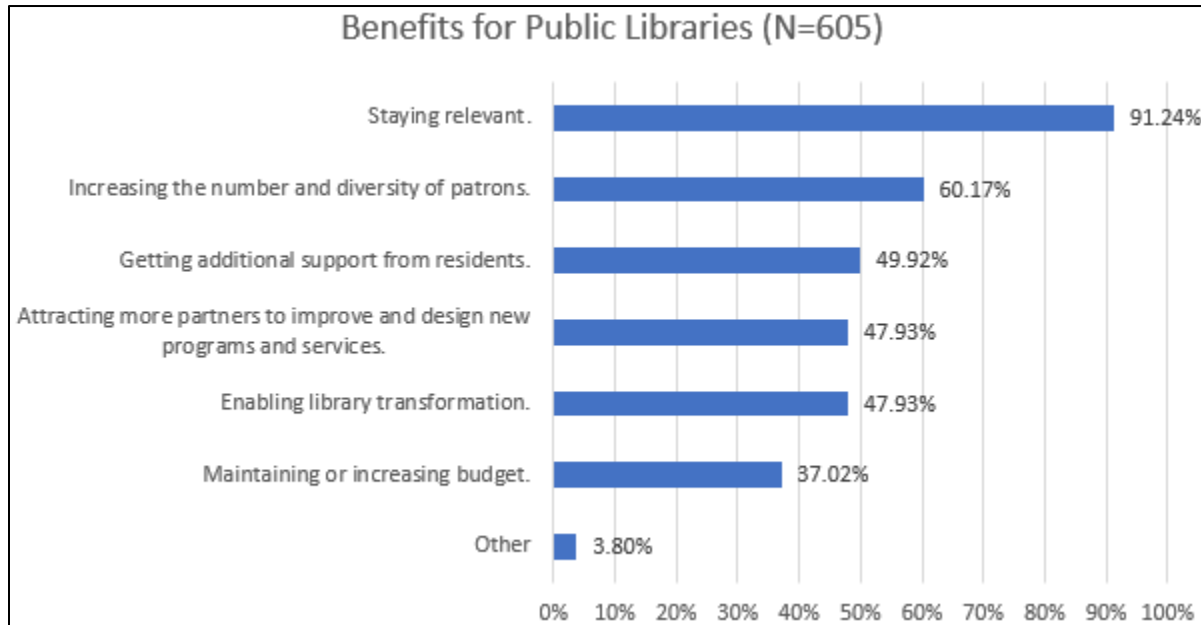


Figure 20. Benefits for Public Libraries

According to the additional comments, many public libraries are working toward achieving these benefits, but due to the pandemic, libraries are closed or only open virtually. Many programs and services are suspended, and development is on hold, which has delayed the whole process and is making it extremely challenging for them to serve the communities.

6.3. Costs and Challenges

Besides benefits, public libraries also incur in different costs and challenges when they participate in the development of smart communities (See Figure 21-22).

Among all the costs, the financial cost of buying and updating technology (90.69%), financial and time cost in designing new programs and services (85.49%), financial and time cost in training staff (83.75%) and financial and time cost in outreach and marketing activities (79.18%) are mentioned by most of the public libraries.

The additional comments provided by survey respondents indicate that public libraries often incur financial and time costs on aspects related to public library operations, such as facilities renovation, technology upgrade and purchasing new technology, and hiring staff.

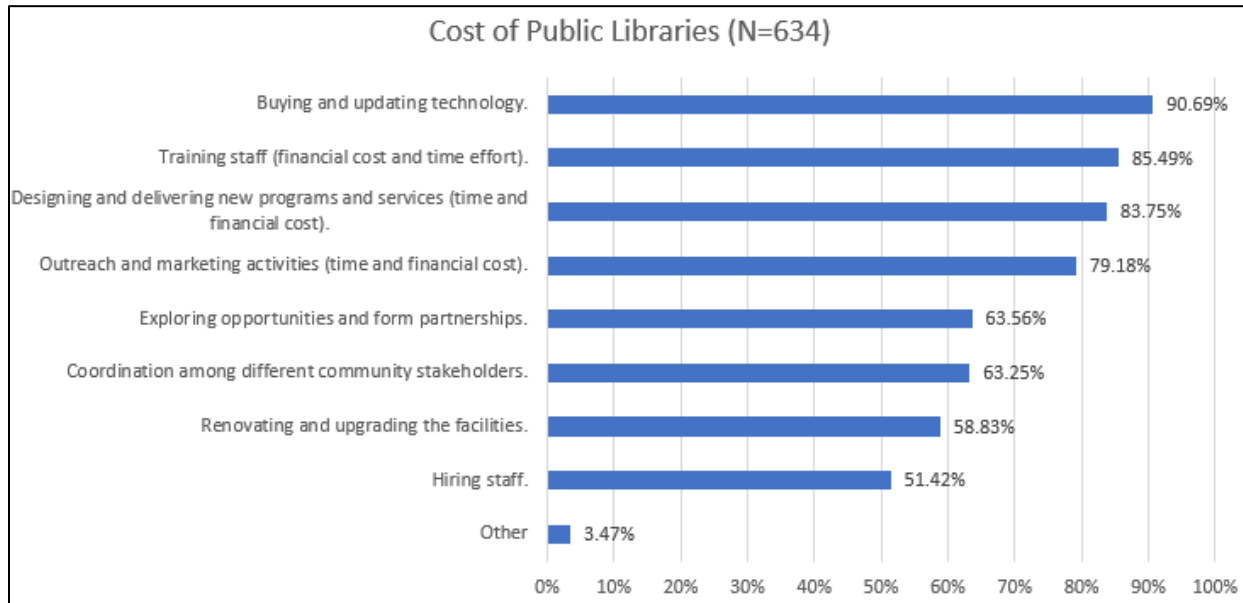


Figure 21. Costs of Public Libraries

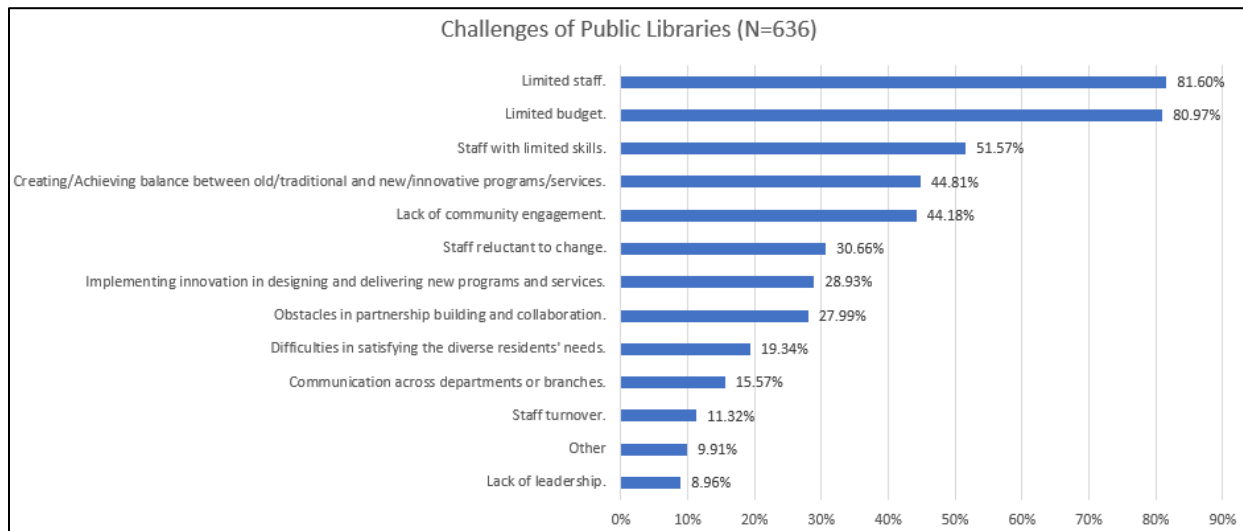


Figure 22. Challenges of Public Libraries

Limited staff (81.60%) and limited budget (80.97%) are the two biggest challenges that public libraries have encountered in their participation in the development of smart communities. About half of the public libraries also experience challenges like staff with limited skills (51.57%), achieving balance between traditional and innovative programs and services (44.81%), and lack of community engagement (44.18%).

According to the detailed comments, there are other challenges that public libraries often experience. First, there are limits in building size, facilities, and location (particularly rural areas with no broadband access), which greatly constrain public libraries' abilities to more intensively use technology. Second, it is difficult for public libraries to attract older residents and those who are not interested in technology to visit the library and take advantage of the available technological resources. Third, there is a lack of recognition by the local governments and their leadership about the role public libraries can play in the development of smart communities.

6.4. Success Factors

There are many factors affecting the success of public libraries' participation in the development of smart communities (See Figure 23).

About 80% public libraries think it is important to create a welcoming environment that helps with citizen engagement (81.19%) and makes public libraries accessible to the community (77.65%). About 60% of the public libraries think that the ability to better identify community needs (68.65%), have library staff that is willing to learn and adapt to new programs and services (64.15%), the availability of basic and advance technology infrastructure (63.67%) and the ability to form partnerships (59%) also help achieve success. Leadership (53.54%), financial support from the government (47.91%), expertise in education and training (44.37%), and investment in outreach and marketing (42.6%) are other success factors that are less mentioned by public libraries.

Additional comments also indicate that community support and multilingual/multicultural staff could be of great help for public libraries to better serve the diverse population in their community and be successful in their contribution to the development of smart communities.

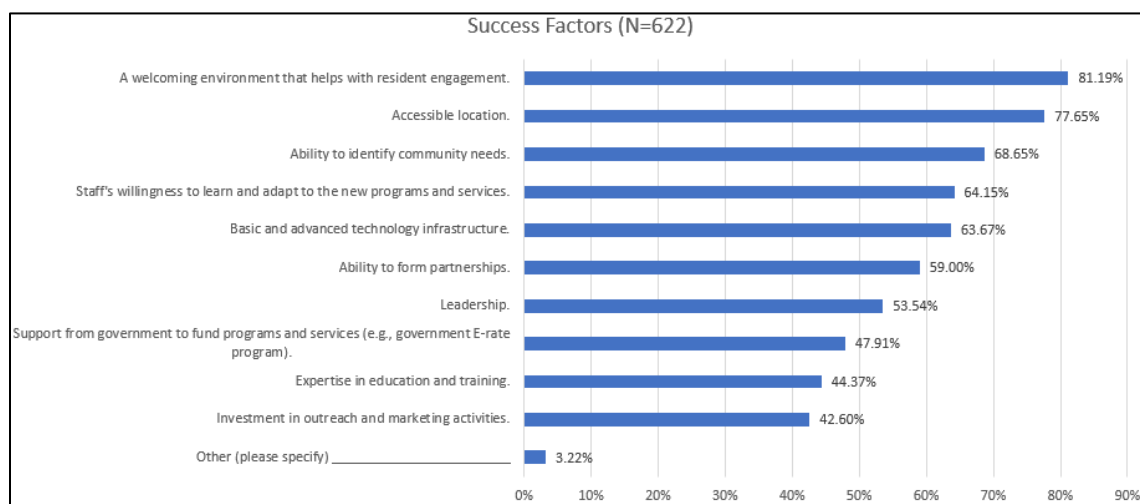


Figure 23. Success Factors of Public Libraries

7. Public Libraries' Future Participation in the Development of Smart Communities

In this section, we report how public libraries that are not currently involved in the development of smart communities would like to participate in the future. We include programs and services, collaborations, benefits, costs, challenges, and success factors.

7.1. Programs and Services

Providing free computer training and classes at various levels is the most mentioned future program or service that public libraries would like to invest in for the future (61.31%). Over half of the public libraries also would like to provide services for underserved communities (56.78%); provide digital literacy and digital skills programs and services (54.77%); become a technology hub with free access to high-speed Internet, public access computers and other advanced technologies (50.75%); and provide space for citizen engagement (50.25%).

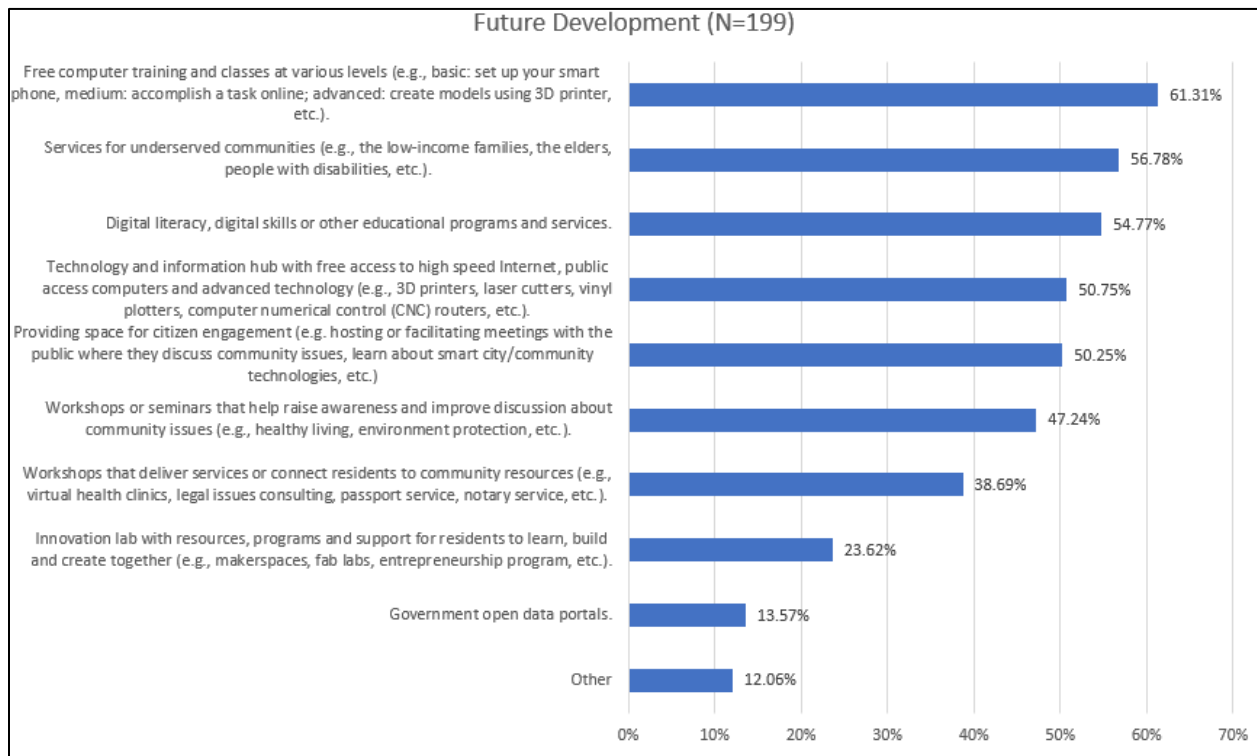


Figure 24. The Future Development of Public Libraries

7.2. Strategies

In order to become more involved in the development of smart communities, more than 50% of the public libraries think they should adopt the following strategies: 1) actively building partnerships (62.07%), 2) actively applying for funding (61.08%), 3) outreach and promoting libraries' brand, programs, and services (58.13%), 4) actively being involved in conversations with the local government and other community stakeholders (52.22%). Hiring more staff (19.7%) and bringing in consultants (7.88%) are two strategies that are least mentioned by public libraries.

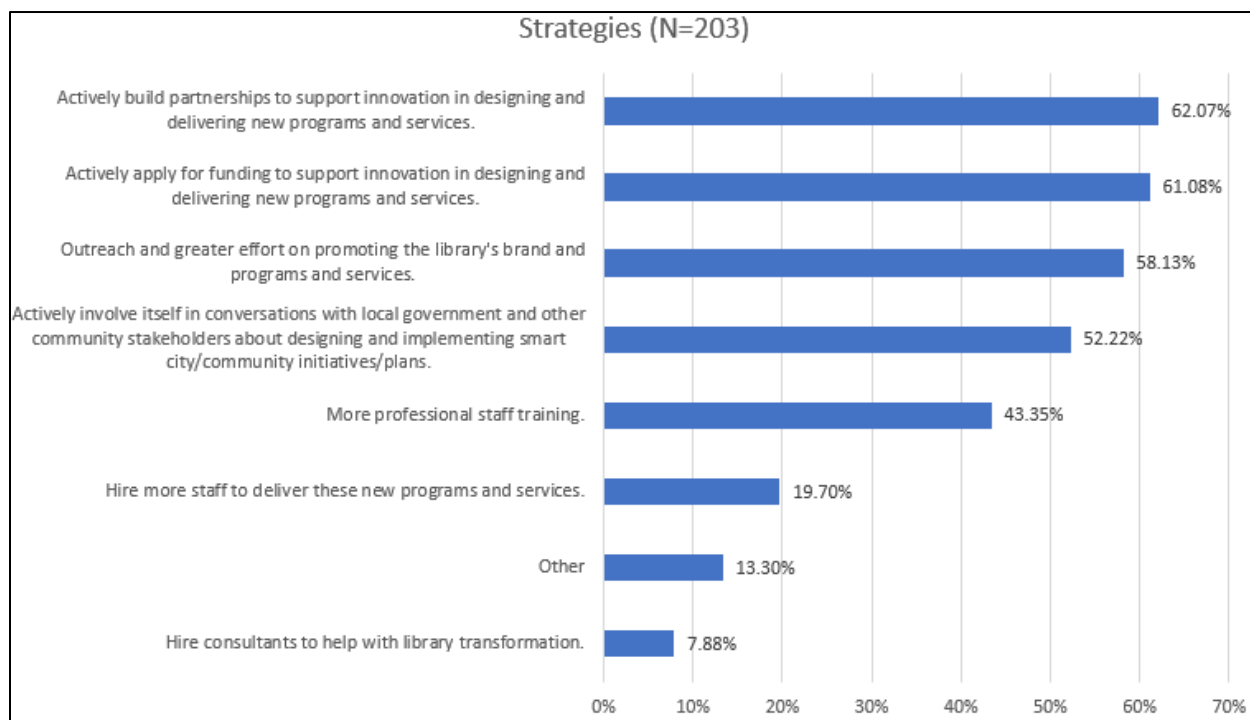


Figure 25. The Strategies of Public Libraries' Future Development

According to the additional comments, some public libraries indicate that they do not have the capacity to do any of these future investments even though they would like to. The negative impact of the pandemic is also mentioned by many respondents. For the future development of their programs and services, they need to acquire more physical space and additional budgetary support.

7.3. Potential Benefits

We also asked public libraries that are currently not contributing to the development of smart communities what potential benefits (for residents, the whole community and public libraries themselves) they would achieve if they became more involved in the development of smart communities. Their responses are quite consistent with the perceptions of public libraries that are currently contributing to the development of smart communities (See Figure 26-28).

More than 60% of the public libraries think that residents will receive benefits in many different aspects including improved digital literacy (78.71%), safe and comfortable space for collaboration and innovation (67.33%), increased community engagement and satisfaction (65.35%), and free access to high-speed Internet and different kinds of technologies (63.86%).

Over 60% of the public libraries think that communities will receive benefits such as bridging digital divides (74.88%), satisfying community needs (69.95%), improving community connectivity (68.97%) and preparing smarter residents to make the community smarter (66.50%).

Over 80% of the public libraries think staying relevant is the biggest potential benefit for public libraries if they increase their involvement in the development of smart communities. Increasing users (70.34%), additional support from residents (65.02%), attracting more partners in designing programs (61.58%) and enabling library transformation (51.72%) are other potential benefits that are also mentioned by over 50% of the responding public libraries.

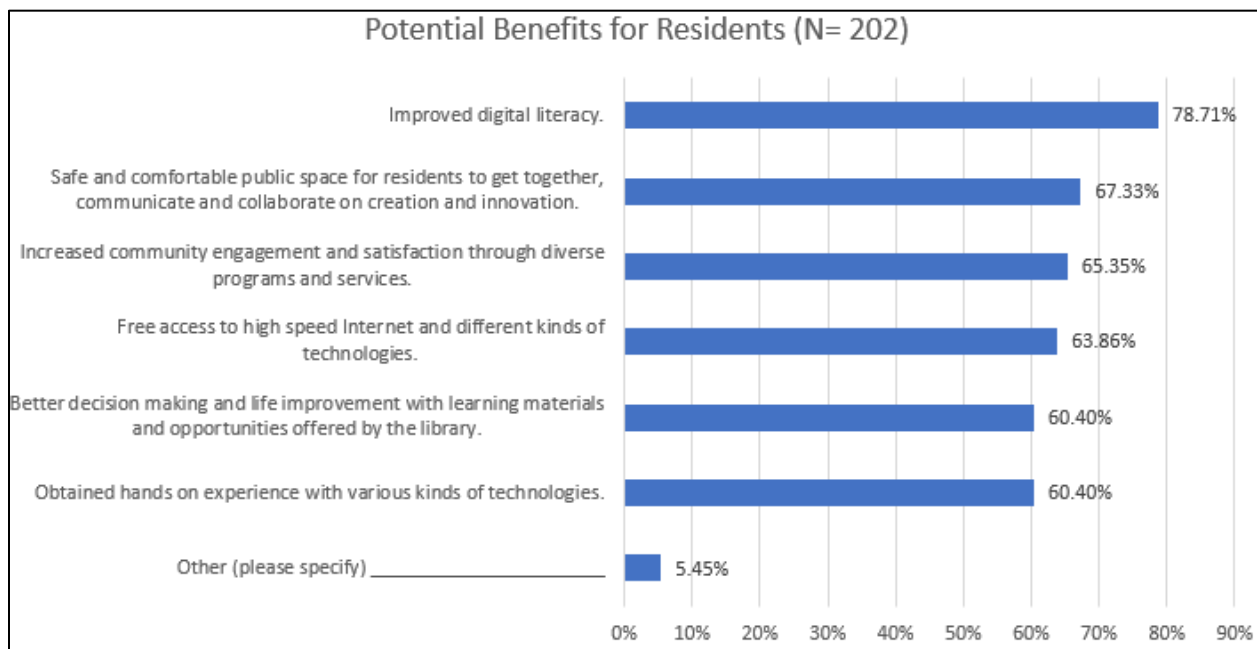


Figure 26. Potential Benefits for Residents

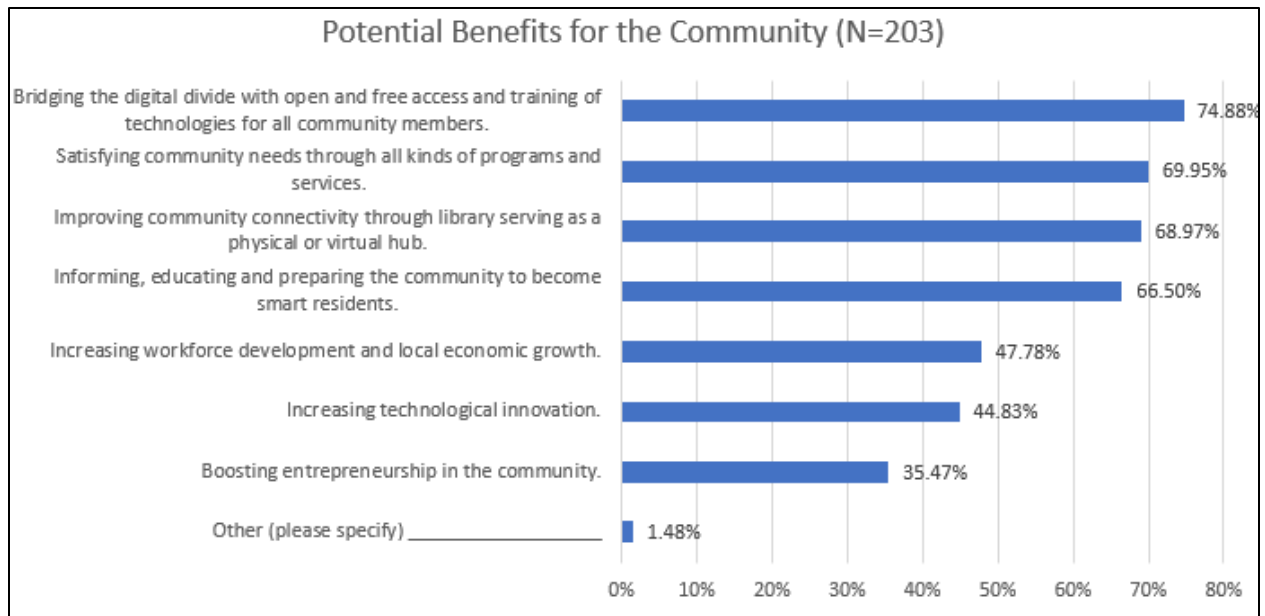


Figure 27. Potential Benefits for the Community

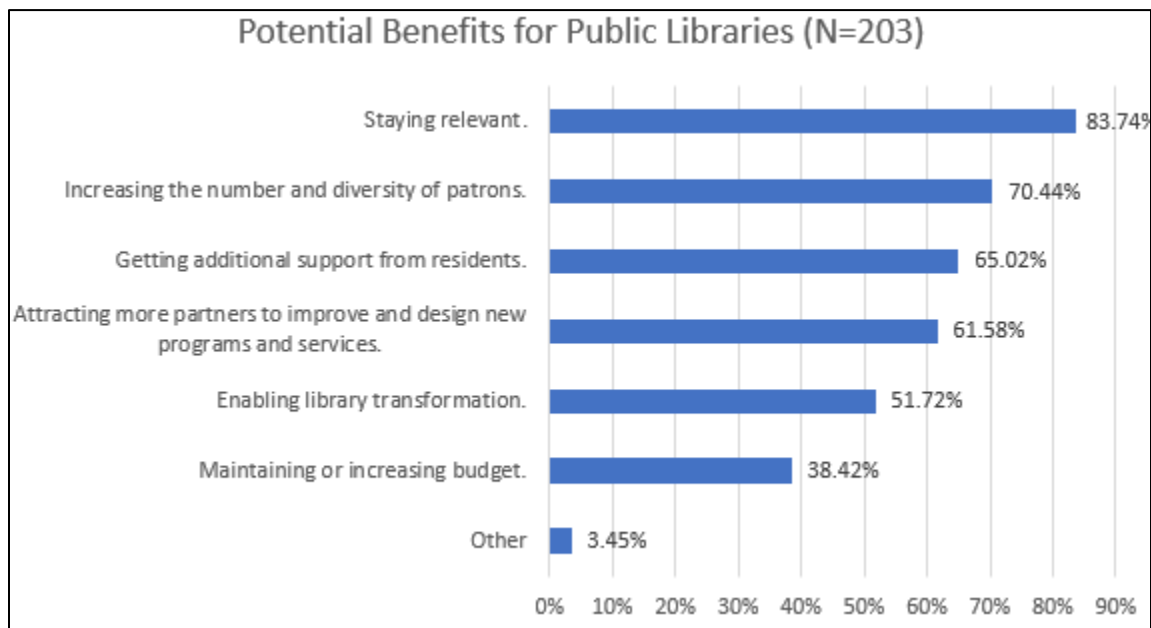


Figure 28. Potential Benefits for Public Libraries

7.4. Potential Costs and Challenges

Besides potential benefits, public libraries that are currently not contributing to the development of smart communities also think they would incur different costs and challenges if they became more involved in the development of smart communities. The

responses are aligned with the perceptions of public libraries who are currently contributing to the development of smart communities (See Figure 29-30).

Financial costs from updating technology, financial and time costs from designing new programs and services, and training staff are the top three potential costs identified by over 75% of the public libraries. Over 50% of public libraries also view outreach (69.65%), renovating facilities (51.74%), hiring staff (50.25%), coordination among stakeholders (51.74%), and forming partnerships (56.72%) as other important potential costs.

Limited budget (90.64%) and limited staff (88.18%) are the biggest potential challenges mentioned by the public libraries. Staff with limited skills (61.85%) and lack of community engagement (62.07%) are another two important potential challenges mentioned by more than 60% of public library respondents.

In terms of the potential costs and challenges in the future development of public libraries, most of the additional comments of public libraries emphasize that limited budget, space, and staff, some characteristics of their community (rural, aging population, low-income residents) and the influence of the pandemic (concern about the funding) has made many public library professionals less optimistic about their future involvement in the development of smart communities.

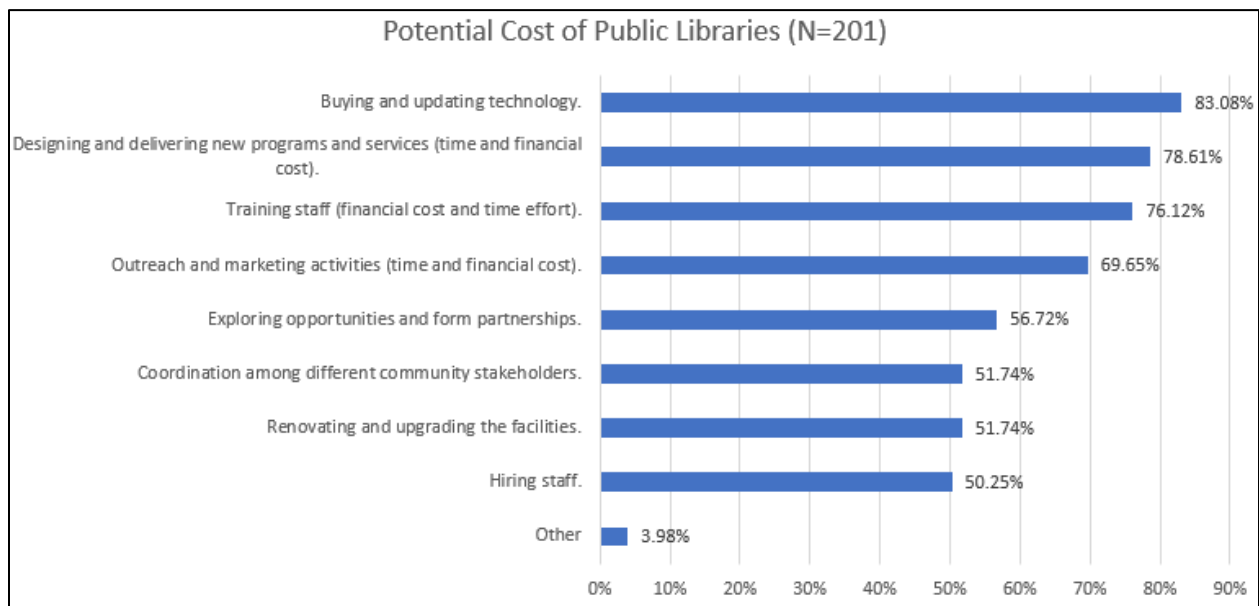


Figure 29. Potential Costs of Public Libraries

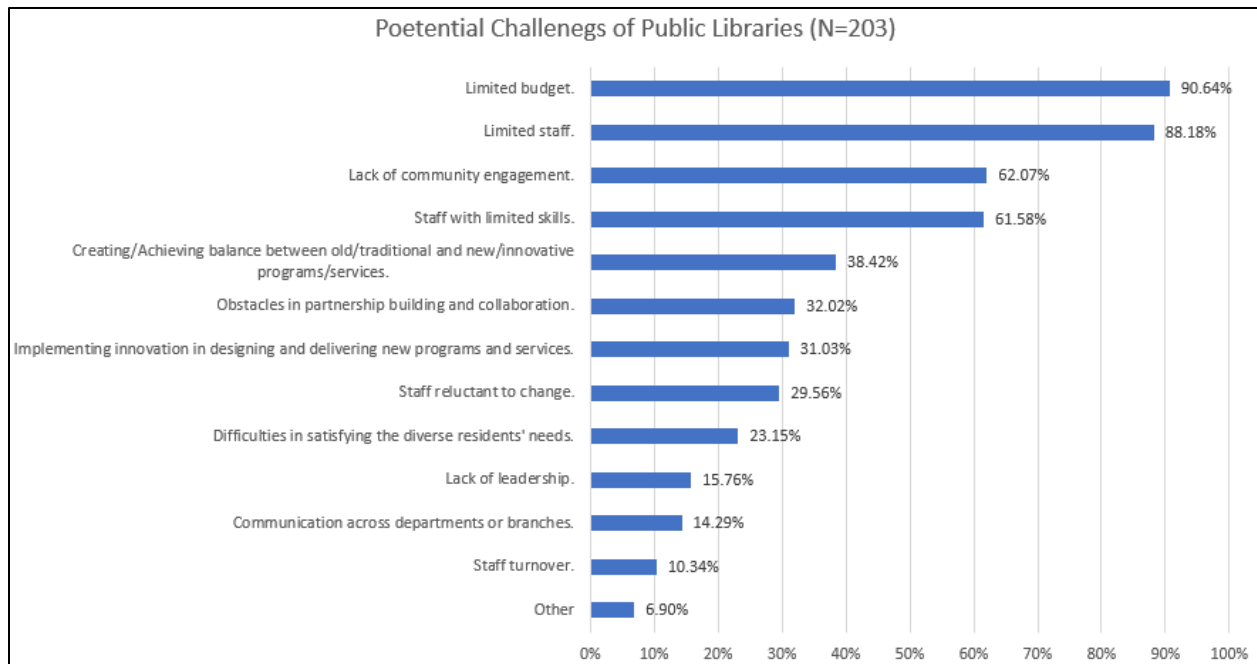


Figure 30. Potential Challenges of Public Libraries

8. Initial Implications

The following section describes some initial implications based on public libraries' responses to questions about the concept of smart city, the development of smart communities, the role of public libraries in the development of smart communities, as well as the benefits, costs, challenges and expected future contribution of public libraries to the development of smart communities.

In terms of the concept of a smart city, rather than emphasizing the importance of technologies, many public libraries have adopted a comprehensive view on the concept of smart city/community and think that the development of a smart city/community is about the development of different aspects of the communities, such as improving access to community resources, improving residents' quality of life, improving residents' digital literacy, and making community more connected. Even though, it seems that public libraries have a broad understanding about the concept of smart city/community, the majority of the public libraries are not aware of the specific smart city initiatives in their communities. This could be because there is lack of smart cities initiatives in their communities (40% of the public libraries that participated in our survey come from small community with population less than 5,000), or public libraries are not involved in the design and implementation of the smart city initiatives in their communities. All these in some extent affect public libraries' perceptions about the role they are playing and can play in the future to contribute to the smartness development in their communities. This is illustrated in more detail in the following paragraphs.

Public libraries view themselves as playing different roles in the development of smart communities. A very important role is related to digital inclusion, a role that has been

historically played by public libraries. This aligns with the fact that many public libraries that participated in our survey indicate they are currently providing different programs and services, such as free access to high-speed Internet and other technologies, digital literacy training, services for underserved community, and space for citizen engagement to help bridge the digital divide and improve residents' digital literacy and skills. These responses stay the same when public libraries who are not currently involved in the development of smart communities talk about their expectations on the future development of their programs and services.

Besides this important role related to digital inclusion, there are some new roles that public libraries have the potential to provide -- but are only just starting to play in the context of smart communities, such as improving community members' awareness and facilitating their participation in smart city initiatives and supporting innovation by, for example, assisting in the development of local economy and entrepreneurial activities.

The consistency about public libraries' perceptions on their current and future programs and services that contribute to the development of smart communities and the timidity of public libraries in playing new roles besides improving digital inclusion indicate that even though public libraries seem to have a more comprehensive view about the smart city/community and think it is more than technology, the role they are playing and the programs and services that they are currently providing and will provide in the future to contributing to the development of smart communities are still mostly technology related.

As to the current involvement of public libraries in the development of smart communities, the majority of public libraries are not collaborating with other organizations. Further, a quarter of the public libraries do not think they are currently contributing to the development of smart communities at all. In this respect, it is interesting to note that, even though some public libraries are providing programs and services that could make a contribution to the development of smart communities, they are not explicitly making this link. These responses may be the result of a lack of an official smart city strategy in the community, since most of them are located in small communities, or the fact that often public libraries are not included in the design and implementation of the development of smart communities. These potential explanations actually align with the fact that the majority of the public libraries are not aware of the smart city initiatives in their communities.

Most public libraries think that their participation in the development of smart communities has brought many benefits to residents, which are actually benefits that derive directly from programs and services currently offered by the public libraries. For example, one of the most mentioned benefits for residents is bridging the digital divide. Given that most libraries are focused on offering access to technology and training, a contribution to bridging the digital divide is just the natural result. There is also consistency between the current benefits that public libraries have obtained, and the potential benefits perceived by the public libraries who will participate in developing

smart communities in the future. However, we also recognize that these benefits are not new and public libraries have been serving the community in this way for a long time. Their perceptions on the obtained benefits and potential benefits also show the dominance of a technological perspective on the concept of smart city/community, despite their comprehension of what a smart city/community is broader and goes beyond technology.

Public libraries also indicate there are and will be various costs and challenges in their current and future participation in the development of smart communities. The most mentioned current and future costs and challenges stay the same, they are both about limited budget to support buying and updating technology. This aligns with the role of that most public libraries perceive they are playing in the development of smart communities, which are bridging digital divide, improving residents' digital literacy and skills and support for residents' engagement and innovation. It also aligns with the programs and services they currently offer and plan to offer in the future to contribute to the development of smart communities, which are mostly related to technology provision, technology training and resources for citizen engagement and innovation.

Acknowledgements

The authors would like to thank public libraries professionals who participated in our survey and libraries associations across the United States, who helped promote and distribute our survey. This survey is implemented in partnership with the American Library Association (ALA)'s Center for the Future of Libraries and funded by the Institute of Museum and Library Services under Grant No. LG-96-17-0144-17. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the Institute of Museum and Library Services.

About CTG UAlbany and About this Project

The Center for Technology in Government at the University at Albany (CTG UAlbany) works with governments worldwide transforming public services through innovations in technology, policy and management. A research institute at the University at Albany, State University of New York, CTG UAlbany was established in 1993 to pursue new ways to use technology to address practical problems of information management and service delivery in government.

CTG UAlbany collaborates with hundreds of domestic and international researchers on understanding and applying emerging technologies. At the same time, CTG UAlbany works with scores of local, state, federal, and international government bodies as a trusted advisor and consultant through funded projects about management and policy

decisions to govern the use of new technologies as tools for public service transformation.

More information is available at: <https://www.ctg.albany.edu/>.

The four-year research project “Enabling Smart, Inclusive, and Connected Communities: The Role of Public Libraries” is one of CTG UAlbany research projects conducted in partnership with the American Library Association (ALA)’s Center for the Future of Libraries. It aims at better understanding how public libraries can advance their role as community anchors in smart city and community initiatives by contributing to the community’s understanding of and participation in such initiatives. Two research questions guide the study: 1) to what extent do public libraries, building on their expertise, knowledge, and background, contribute to communities’ understanding of and participation in smart city initiatives?, and 2) what are the existing and potential benefits, costs, risks, challenges, and unintended consequences for public libraries increasing their involvement in their communities’ smart city initiatives?

To address these two research questions, the following activities have been conducted: 1) a literature and current practices review, 2) an analysis of four case studies, and 3) a national survey. The project includes two main deliverables, the Opportunity Agenda and Roadmap Report and the Libraries in Smart Cities and Communities Toolbox, as well as several dissemination activities of results. The research is supported by the expertise of an Advisory Board which has provided strategic advice for multiple stages and activities.

The intended outcomes for public libraries, local governments, and researchers include:

1. Increasing and sustaining relationships and collaborations between libraries and other organizations, such as city governments and community organizations.
2. Designing and developing two new and replicable resources to guide libraries willing to advance their role as community anchors in smart cities and to provide libraries with numerous resources and ideas for new programs and services contextualized to community issues/interests: the Opportunity Agenda and Roadmap Report and the Libraries in Smart Cities and Communities Toolbox.
3. Enhancing the relationships between researchers and practitioners by communicating research findings in different events and ways that will lead to improvements in library services.

More information at: <https://www.ctg.albany.edu/projects/imls2017/>.

Appendix I. Survey Methodology

This public library survey was distributed in two rounds. In the first round, the survey was distributed to 8,230 public library directors across the United States through a SurveyMonkey email invitation. The survey was available from October 4th to November 30th, 2020, and reminders were sent to non-responders on a weekly basis. Within this sample, 495 email invitations bounced and were replaced with alternative contacts, and survey invitations were sent to these new contacts via email. 165 individuals opted out of the survey without replacement.

We also used phone calls to follow up with a 10% random sample. At the end of the first round, 1,143 individuals participated in our survey. In the second round, we shared the survey link with library associations across the United States and asked them to share the survey link with their public library members on our behalf from December 2nd, 2020 to January 15th, 2021. One hundred and seventeen individuals participated in our survey. After the two-round distribution, we received 1,260 responses.

Before we distributed the surveys, we conducted two pretests and one pilot test to correct and validate the measures. For the two pretests we conducted one internally with researchers in our center (N=7) and one externally with subject experts (N=13) to check the language being used and the flow of the survey questions. The pilot test was conducted with 5% of the sample (N=433). The pretests and pilot tests lead to some revisions in the survey.



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