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# Teacher Education and Professional Development in Industry 4.0



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# Teacher Education and Professional Development in Industry 4.0

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## Preface

The fourth International Conference on Teacher Education and Professional Development (INCoTEPD) was held in Yogyakarta, Indonesia on 13–14 November 2019. The event is an annual agenda organized by the Institute of Educational Development and Quality Assurance of Yogyakarta State University. Responding to the current development in the teaching business, the fourth conference explored “Teacher Education and Professional Development in Industry 4.0”. The conference gained significant responses from students, teachers, lecturers, researchers, and practitioners of different expertise in Indonesia and beyond.

The committee invited Prof. Dr. Ismunandar, Director General of Learning and Student Affairs Ministry of Research, Technology and Higher Education and Dr. Supriano, Director General of Teachers and Education Personnel Ministry of Education and Culture of the Republic of Indonesia as the keynote speakers. The committee also invited Dennis Alonzo, Ph.D, University of New South Wales Australia, Assoc. Prof. Zuzana Tomas, Eastern Michigan University, United States of America, and Dr. Ibrar Bhatt, School of Social Sciences, Education and Social Work, Queen’s University Belfast, UK as invited speakers. While keynote speakers discussed the current trends in learning and teacher education and professional development in response to Industrial Revolution 4.0, invited speakers and participants presented their papers on topics which can be categorized into 4 subthemes, namely Education and Teacher Skills in Industry 4.0, & Education for Industrially Disadvantaged Societies; Teacher Education and Professional Development to Promote Teacher Competencies for Industry 4.0 Education; Curriculum and Learning Materials, Teaching-Learning Process, & Assessment to Promote Industry 4.0 Skills; and Technology and Media in Industry 4.0 Education.

The committee received 154 submissions of papers that were selected by the academic board into 125 eligible papers for presentation at the conference. After two eventful days of conference and further revision by the presenters, the full papers were then reviewed for the second time and the board decided that 63 of the revised papers covering the four sub themes qualified for publication in the conference proceeding that is published by CRC Press. The editors are really pleased with the processes and would like to congratulate all presenters and authors whose papers are published in this volume.

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*Plenary speakers' papers*





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## Participation in building human resources: Independent strategies for facing a demographic expansion in a remote island

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**ABSTRACT:** This research was conducted to examine the strategies of residents in Sapeken (a remote island) in facing a demographic expansion, especially in terms of human resource development in improving the competitiveness of fishing communities. This study used the descriptive-qualitative method by collecting data through in-depth interviews and observation, as well as data tracking online and offline. This research used Arnstein participatory theory. It was found that the population density on this island exceeded the average population in large cities. Beside working as fishermen, many people maintain economic independence by becoming small and medium-level traders, especially home-based businesses. The incomes of the residents are used to contribute to the success of the implementation of education, both in the personal context to finance the education of families, and to provide charity to religious and public education institutions. Thus, education is the main factor in dealing with the demographic expansion. In the future, having faster leverage and stronger, and more intense synergy is needed among civil society, with the assistance of universities and local governments in accelerating the development of human resources. Community participation is at the level of a partnership, including in the degree of citizen power.

### 1 INTRODUCTION

Countries worldwide are currently facing problems with high population levels in each state. Indonesia ranks as the fourth largest population in the world, after China, India, and the United States. According to the US Department of Commerce Census Bureau data for 2014, China ranked first with a population of 1,355 billion followed by India, which has a population almost the same as China with 1.236 billion, followed by the United States with a population of 318,892 million, while Indonesia ranked fourth with a population of 253.60 million (Purnomo 2014).

Japan and Korea are two countries whose populations, especially the elderly populations, have grown faster compared to other countries in Asia. Likewise, in Singapore, the elderly population, in particular, has experienced a relatively rapid growth rate (Banister et al. 2010; Park et al. 2012; Peterson 2017). Interestingly, the three countries have made anticipatory efforts to resolve the rate of population growth, especially among the elderly population (Chawla et al. 2007, United Nations 2007; Heryanah 2015; Goodhart & Pradhan 2017.).

Indonesia is estimated to be at the peak of the first wave of a demographic expansion in 2017 until 2019 (Oberman et al. 2012; Hayes & Setyonaluri 2015; Ginting et al. 2018), while the second wave of demographic expansion will take place in 2020 until 2030. In those years, the population of people of a productive age (age 15–64 years) will be at the maximum level compared to the nonproductive ages, namely the age of 0–14 years, and aged 65 years and over. This can also be interpreted as the increasing number of potential workers who can improve the Indonesian economy (Jati 2015).

The Director of the Population Control Policy Integration-BKKBN (*Badan Koordinasi Keluarga Berencana Nasional* or Population and Family Planning Board) states that the demographic expansion does not automatically increase Indonesian economy and the welfare of its citizens. It requires adequate human resource requirements, high competence of the citizens, competitive levels of education and skills, and other things that support the economy such as the availability of jobs (Adib 2016).

The education factor and the quality of human resources that Sunarto considers as the requirements for facing the demographic expansion are justified by the Minister of Education and Culture of Indonesia, Mr. Anies Baswedan. According to Mr. Anies, education in Indonesia is still in a bad position, as evident by indicators such as the low quality of education, the low level of education services, as well as the low quality of higher education and low literacy level of students. Naturally, this will have a direct impact on the graduates of primary and higher education produced (Widodo 2016).

The dilemmas faced by the Indonesian people also occur in the archipelago. With abundant demographic conditions and poorly distributed development in the country, there are many Indonesians who are not as fortunate as those who live in Java or other cities and cannot afford a good quality of education. People in the archipelago who work as fishermen are synonymous with underdevelopment in the field of education. The residents on Saur Island and Saibus Island, Sumenep, live in poverty. The poverty experienced by the islands' communities causes them not to take much care of their children's education (Rahman 2018). Many islanders spend their time in the sea crossing the island to work and find fish. So, in general, there is a minimal amount of interaction with the field of education. As a result, their children's education is left to the educational institutions, whether formal or Islamic schools (Nurwidodo et al. 2017; Subardjan 2017).

The fishermen inhabit Sapeken Island at the Sapeken Subdistrict, one of 127 islands in Sumenep Regency, East Java, which has a large and dense population. The population of the island, which covers only 5 square kilometers, is 8,900. The population density of the island is very high, even exceeding the population density of other large cities in Indonesia such as Jakarta, Bandung, and Surabaya. Despite having a large population, Sapeken Island is categorized as a metro island (Suprajaka et al. 2012). Prior to this study, research on demographic expansion had already been conducted by other researchers, including Putro (2016), who described the education of immigrants in Papua with educational capital that was more than the local population changing conditions the economy of the local community.

This study used the perspective of participatory theory of Sherry R. Arnstein (Arnstein 1969). Arnstein (1969) formulated community participation as a form of citizen participation that is citizen power, in which there was a division of forces that allowed the have-not citizens who are now excluded from the political and economic process to be involved later. Community participation can be divided into eight levels. From highest to lowest, these are: (1) Citizen control: the community can participate in the system and control the entire decision-making process. The community has the power to regulate programs or institutions related to its interests. (2) Delegated power: the community is given an abundance of authority to make decisions on certain plans. To solve the problem, the government must negotiate with the people, without pressure from above. (3) Partnership: the community has the right to negotiate with the government, based on mutual agreement of power/responsibility shared between the community and the government. (4) Placation: the government needs to appoint a number of affected people to become members of a public body, who have certain access to the decision-making process. Even though in the implementation the community's proposal is still being taken into consideration, because the position is relatively low and the number is less than the members of the government, it is not possible to make decisions. (5) Consultation: the public is not only notified but also invited to share opinions, although there is no guarantee that the opinions expressed will be taken into consideration in decision making. (6) Informing: the power holder provides only information to the community related to the activity proposal and the community is not empowered to influence the results. Information can be in the form of rights, responsibilities, and choices, but there is no feedback or power for negotiations from the public. (7) The therapy-holder gives the reason for the proposal by

pretending to involve the community. Although involved in activities, the aim is to change the mindset of the community rather than getting input from the community itself. (8) Manipulation: people are only used by name. Activities are used to manipulate information to gain public support and promise better conditions even though this will never happen. From the typology proposed by Arnstein, community participation is classified into three large groups, namely (1) nonparticipation, which includes manipulation and therapy; (2) community participation in the form of receiving several provisions (degrees of tokenism), including informing, consultation, and placation; and (3) community participation in the form of the degrees of citizen power, including partnership, delegated power, and citizen power.

In the perspective of community participation in the development of human resources in Indonesia, several studies have been conducted in relation to participation in education (Chusnah 2008; Nurjanah 2018; Ittihad 2019) and community participation in village development planning (Asjhari 2013; Ikbali & Jabbar 2019). However, research on community participation to deal with the demographic expansion, especially in the remote areas, is still very rare. This issue serves as the basis of the significance of this research. This research is the first in assessing community participation in remote areas in dealing with the demographic expansion through human resource development. Because of this specificity, this study may serve as a reference for future researchers and is indeed expected to pave the way for research related to the theme. This research was conducted to find out the answers to the following questions: How do residents in a remote island such as Sapeken carry out the strategies in dealing the demographic expansion amid the lack of government attention and available human resources? What are the results of the strategies in improving the quality of island human resources?

## 2 METHOD

This research used a qualitative descriptive method, with a single case study on Sapeken Island, Sumenep Regency, East Java, where the population density was above the average of major cities in Indonesia, as well as other islands in the Indonesian archipelago. The research focused on the strategies carried out by residents on the small island of Sapeken, Sumenep, East Java Province, in dealing with the demographic expansion. The theory used in this research was the Arnstein participatory theory (Arnstein 1969). This study collected data by conducting in-depth interviews with a number of informants on Sapeken Island, ranging from parents, community leaders, government officials, activists, educators, and students to scholars who successfully entered the workforce. In addition to in-depth interviews, data collection was also done by direct observation of the activities of the citizens from the economic sector, starting from markets, shops, educational institutions, schools, boarding schools, and others.

## 3 RESULTS AND DISCUSSION

Sapeken Island is a region of Sapeken Village, Sapeken Subdistrict, Sumenep Regency, East Java Province that has an area of 5.27 square kilometers, consisting of 11 hamlets, 12 RW (community units), and 51 RT (neighborhood units), which are inhabited by the Bajo people as the majority, some people of Mandar and Madura, and some traders from Java, of which the majority are Muslim, with religious organizations such as *Persatuan Islam* (Persis), *Nahdlatul Ulama* (NU), and *Muhammadiyah*. The number of residents of Sapeken Island is 8,894, with 2,523 family heads.<sup>1</sup> On average, residents of Sapeken Island work daily as fishermen and traders, with a small portion being civil servants (*Aparatur Sipil Negara*/ASN). Judging

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1. Interview with Mr Anwar Sadat, Head of Sapeken Village, in his office, May 1, 2018

from the island's size and population, the island of Sapeken is fairly dense, as the total island area of 5,000 square meters is occupied by almost 8,900 inhabitants.<sup>2</sup>

In the economic sector, the population of Sapeken Island is independent. Instead of relying on government assistance, the islanders work as fishermen. This can be seen from the composition of the population who on average work as fishermen. Fishermen on this island are grouper and lobster fishermen or catch other fishes that have high economic value. In terms of income, the average fishermen earn IDR 2 million to IDR 3 million per month, while the cost of living ranges from an average of IDR 1 million to IDR 1.5 million. This means that every family has the opportunity to save IDR 500,000 to IDR 1 million.<sup>3</sup>

Besides being a fisherman, more than 30% of families own their own businesses in the form of kiosks or small shops. At least 800 families have businesses ranging from small, medium, to large scale. Turnover per day of small traders on Sapeken Island is around IDR 400,000 to IDR 500,000, while traders in the middle category earn around IDR 3 million to IDR 5 million. The turnover of traders in the large category ranges from around IDR 10 million to IDR 20 million. Those categorized as small businesses are kiosks and grocery stores that are usually integrated into houses. In addition, there are snack, drink, and food vendors who sell their products in food stalls. Medium-sized businesses are businesses in the form of stand-alone shops and are located in markets, docks, and economic centers of the island; they sell clothing, electronics, fuel, fish/ice, and others. Meanwhile, the large traders are involved in fish cage businesses, distribution of fuel oil, and large stores.<sup>4</sup>

The mobility of the residents of Sapeken Island is quite high compared to that in major cities in Java and Bali. This mobility occurs along with the abundance of marine products, in the form of lobsters and fish sent to Java and Bali both in live, frozen, and dry forms. Every day there can be two or three ships belonging to fish entrepreneurs who leave for Bali and Java to send fish catches produced by local fishermen. In Bali, the commonly used ports are Sangsit, Singaraja, and Tanjung Benoa. Besides Bali, Java and Madura are also destinations that are often visited by residents of Sapeken Island for business and other purposes. Banyuwangi and Panarukan, as well as Kalianget Port in the Sumenep Regency of Madura, are locations that are usually visited by Sapeken fishing boats.<sup>5</sup>

The activities and lives of residents on Sapeken Island resemble those in the typical cities, especially during the day. In the morning, together with students going to school, fishermen also come with boats carrying fish in warehouses and fish buying centers, while a little late in the day, residents from various islands come to Sapeken Island for various purposes, such as business and government affairs. They then return to their respective islands in the afternoon. In the afternoon, fishermen are busy with various preparations to go into the sea. Because of the hustle and bustle of the economic activities of the residents, some often dub Sapeken Island as Little Surabaya.<sup>6</sup>

Variations in the fish species that are caught by the Sapeken Island fishermen have boosted their income. There are various types of fish that have a high economic value such as groupers and the like, as well as lobsters. The type of grouper fish caught by the fishermen costs from IDR 100,000 to IDR 1 million, alive. If it is frozen, the price can be lower, but it is still more expensive than the price of fly fish and cob. The lowest price of frozen fish is IDR 50 thousand and the most expensive IDR 100,000 per kilogram. Apart from grouper fish and lobsters, the sea products that are usually sold by fishermen are sea cucumbers. The selling price of sea

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2. Interview with Mr H. Nursalim, a staff of Civil Registration and Population Office in Sapeken District, May 2, 2018.

3. Interview with Mr Nining, a grouper fisherman, in his house at Kampung Mandar Sapeken District, May 3, 2018.

4. Interview with Mrs Nurul Supiati, fuel traders, in her store, May 3, 2018.

5. Interview with Mr Wawang, the owner of primary food carrier, in his house, May 3, 2018.

6. Interview with Mr KH. Ad-Dailamy Abu Hurairah, public figure in Sapeken District, in his house, May 4, 2018.

cucumber fishermen is quite promising, starting from the cheapest of IDR 60,000 to the most expensive of IDR 200,000.<sup>7</sup>

The level of participation of residents in Sapeken Island in the education sector is quite high. This can be seen from the efforts of oncor and other fishermen who always set aside a portion of their proceeds for educational institutions where their children are schooled. As stated by Mr Jailani, "At the end of the oncor fish season, a small part of our income is donated to the construction of *pesantren* facilities." This was confirmed by H. Nasir, a fish entrepreneur who is also the coordinator of the construction of the facilities for *pesantren* or Islamic boarding schools. "It is a habit for fishermen to voluntarily hand over some of their earnings to us to be coordinated and used for to build school facilities. On the other hand, other fishermen who specialize in grouper and lobster cultivation do charity activities in the education sector with their initiative to contribute directly to those in need. "We directly contribute based on the needs. If someone needs help constructing a physical building, we donate the materials, but if they need money, we can offer them funding through the management," Ilham, a grouper fisherman explained.<sup>8</sup>

The level of citizen participation in the world of education has an impact on the growing number of educational institutions on Sapeken Island, both in quantity and quality. There are a total of 27 educational institutions and schools on Sapeken Island including 9 kindergartens, 9 elementary schools, 5 junior high schools and equivalents, and 4 senior high schools (Hidayaturrahman 2018).

The spirit of independence in the education sector is also taught by administrators and teachers who are active in various educational institutions in Sapeken. One of them is delivered by H. Nur Asyur, who is one of the teachers at the Islamic Boarding School of Abu Hurairah Sapeken. "In boarding schools, we always put the emphasis on independence, especially in regard to the daily needs among students, like eating, washing and others."<sup>9</sup>

Because of the spirit and independence that are instilled in their educational institutions, high school or Islamic high school (*Madrasah Aliyah*) alumni in Sapeken pursue higher education in bigger cities. However, their financial limitations cause many of them to live in mosques or college dormitories as administrators and in other capacities. This is experienced by Sudarman, one of the *pesantren* (Islamic boarding school) alumni who has now become Dean at the State Islamic University of Imam Bonjol in Padang, West Sumatera. Sudarman admitted that after graduating from *pesantren*, he went to Padang to go to college, and during his studies, he lived at the campus mosque. "I have a great determination to earn my degree, but as I didn't have enough money, I used to live in the campus mosque."<sup>10</sup>

The strength of determination and the spirit of independence of the youth of Sapeken Island got them through university education and made them successful in various fields and professions, including (1) Khairul Faisal, currently a journalist for the Jawa Pos (Jakarta office); (2) Rahmatul Ummah, a book editor and writer in Lampung; (3) Usman Adhim, a catering or culinary business-owner in Malang, East Java; (4) Syamsul Bahri, the organizer of the *Dewan Dakwah Islamiyah Indonesia* (DDII); (5) Taufiqurrahman, a *rawatib imam* at Ancol Mosque, North Jakarta; and (6) Busri Abdullah, a caretaker of Islamic boarding schools in Ciputat, South Tangerang, as well as many others.

According to Malthus et al. (1960), high population density or overpopulation affects many aspects of life in addition to food problems, to the extent that it results in discomfort and social tension. Another issue that is most obvious due to overpopulation is the occurrence of environmental impacts, in the form of natural damage, weakening indigenous culture, and traditional arts. This also spurred the enthusiasm of the younger generation who had

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7. Interview with Mrs Musfirah, a fish collector and sea cucumbers, in her house, May 2, 2018.

8. Interview with Mr Ilham, a grouper fish businessman, in his house, June 3, 2018.

9. Interview with Mr H. Nur Asyur, a teacher in Abu Hurairah Islamic Boarding School, in his school, June 5, 2018.

10. Interview with Mr Sudarman, Vice Dean of Adab Faculty of UIN Imam Bonjol Padang-West Sumatera, in his campus, July 7, 2018.

graduated from senior high school and *madrasah aliyah* to go to major cities and settle in these cities after successfully becoming scholars. According to Diaurrahman, who chose to settle in Malang and teach at one of the vocational high schools, “It just feels more comfortable to live and work in Malang.”<sup>11</sup>

Researching demographics issues cannot be separated from the existence of the first theories generated by experts. The use of theory in research is intended to direct the focus of the research conducted. Analyzing the strategy of developing human resources also cannot be separated from participatory theory. Generally, the citizens of the Sapeken Island have high participation in the issue of education.

According to Arnstein participatory theory, based on the data, community/resident participation is at the level of partnership, including in the degrees of citizen power. This is in line with several research findings that suggest that the tendency of the level of community participation in rural areas in Indonesia based on the typology of ladder of citizen participation is at the level of partnership participatory (Boy & Jamli 2009; Putri 2015; Abdurrahman et al. 2018). When public participation has reached citizen power, then the authorities really treat it in different ways. When they arrive at the Partnership level, they treat the public like coworkers. They work together in designing and implementing various public policies (Putri 2015). According to Sumaryadi (2010), participation means the involvement of a person or community group in the development process both in the form of statements and in the form of activities by giving input of thoughts, energy, time, expertise, and capital and/or material, and taking advantage of and enjoying development results.

Participation is the will to help the success of each program, according to the ability of each person without having to sacrifice their individual interests (Mubyarto 1997). Participation is intended as a continuous two-way communication process (Arimbi 1993). In other words, community participatory is communication between the government as the policymaker and the community as the counterpart who directly feels the impact of the policy (Laily 2015).

Participation is a catalyst for the development of human resources that can synergize with the government and society and universities. The spirit of participating in the community with its independence is a big motivation in accelerating the improvement of the quality of human resources. There is now a need for planning and designing in accordance with the needs and demands of the modern era. One aspect that is needed is the involvement of universities in directing the spirit of participation and independence of the island community in the field of education that is indeed demanded by the times to prevent the island community from being left behind. This is also an important part of civil society participation in enhancing development in remote islands.

Theories that emerge in demographic theory such as the “classical” theory of Thomas Robert Malthus look more at demographic problems in the economic approach and cannot fully describe the state of citizens’ participation and independence in facing the demographic expansion in remote islands. As Malthus noted, the main issue is how to meet the main necessities for daily life, such as food, rather than more complex problems that occur once people have had their basic necessities met. Whereas the development of the population is adjusted to a series of measures, the development of food is in accordance with arithmetic aspect (Todaro 2003).

Malthus was criticized; his thoughts were not fully accepted by other experts (Friedrichs 2014). Malthus is considered not to have taken into account the progress of transportation and advances in agricultural technology that enable the mobility of goods and food materials from one place to another, from places that are a source of food, and have a large supply of food ingredients, even transporting excess to areas with minimal food (Aragrande & Argenti 2001; Friedrichs 2014; Kiladze 2017) as well as advances in agricultural technology allow agricultural products produced in large quantities and multiples, so that it can be distributed to residents in need. According to Faqih (2010), the opposition to Malthus theory actually seeks

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11. Interview with Mr Diaurrahman, a teacher in public vocational school in Malang City-East Java, in his school, July 10, 2018.

to understand that the problem of the population should not only be approached through an economic perspective but also in other ways, such as the social perspective. In this case, Malthus also fails to consider advances in science and technology as a factor.

Arsene Dumont, who followed socioeconomic trends, states that the development of the population stems from the socioeconomic situation of the community. According to Dumont, the issue of the world's population is not merely a matter of food but is also related to social issues in particular, as it could also be social problems that are also directly or indirectly related to the economy. With his theory of social capitalism, humans always want to achieve the highest position and status in society. To realize this, one tends to plan all the big events in one's family (Soeroso 2003).

A person's socioeconomic status can be seen from the stratification or social status. Several aspects that reflect the social status of the population or an individual are occupation, income, and education. The more prestigious one's job is, and the more one's income increases, the higher his social status (Kromydas, 2017; Manstead, 2018). This also applies to the level of education; the higher it is, the more directly proportional it is to social status (Nurqolby 2016).

Human resources will be the main determining factor in the process of growth and development. The demographic expansion that occurs in a country or region can be approached with the development of human resources, especially in the education and economic sectors (Peterson 2017; Agung et al. 2018). The two sectors are two sides of an interrelated coin that cannot be separated. A qualified education will break the chain of poverty and improve one's status because the economic level also increases, which will also be a way for someone to get a qualified education. Thus, the role of human resources for development, especially economic development, is huge. Without the development of human qualities, a country will not be able to achieve a high level of development. Moreover, demographic expansion will only be a disaster, not a blessing (Kasto 1995).

Development of independence through education for remote communities is also in line with the focus on human development, as proposed by Amartya Sen. According to Sen, human development is called capability; hence, Sen's theory is more likely to be called the capability theory (Deneulin & Shahani 2009; Robeyns 2016, 2017). In this theory, human development is more focused on how to build human abilities. Among the many ways to build skills or capabilities, the most basic is to build through education (Muljarjadi 2017).

#### 4 CONCLUSION

Community research done in a remote island such as Sapeken Island is interesting because of the considerable economic potentials of the local residents to independently generate education in their area, thus ultimately create an independent and educated young generation. As fishermen, the local residents of the island show independence and eagerness to obtain a good education, from the basic to tertiary level. They allocate part of their income regularly from fishing for their children's education with the hope that the next generation can have a better living. Moreover, the fishermen are also willing to sacrifice their earnings to donate to educational institutions on their island, whether religious or public schools. Nevertheless, in the future, the island community should not be left alone. They need assistance from the government and universities, so that progress that addresses the development of the time can be realized quickly in a directed manner. According to Arnstein participatory theory, community participation is at the level of partnership, particularly the degree of citizen power.

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