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An Analysis of Skill Levels of Workers in India and their Impact on Earnings: Insights from the Periodic Labour Force Survey 2022-23

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Abstract

India is currently experiencing a favourable demographic situation, with half of its population under the age of thirty years. While this presents a unique opportunity for the country's growth, harnessing this demographic advantage depends heavily on the education and skill levels of its youth. The present study uses unit level data available from the Periodic Labour Force Survey (PLFS)-2022-23 to assesses the skill level of India's workforce by categorizing workers into four skill levels according to the National Classification of Occupations, 2015. The findings reveal a concerning scenario, with 90 percent of workers falling into the two lowest skill categories. While urban areas show slightly better results, there remains significant potential for skill development across all communities, age groups, and sectors. Natural Break maps created using GeoDa software highlight a notable variation in the distribution of skilled workers across Indian states with southern and some northern states having a distinct advantage in terms of skilled workforce. The study emphasizes the critical role of skill enhancement and vocational training, both for individual well-being and overall economic growth. Econometric analysis of the data

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shows that workers with vocational training and higher skill levels earn more compared to their less-skilled counterparts. This underscores the importance of increasing investment in education and training to improve skill levels, thereby fostering inclusive and diffused growth while fully realizing India's demographic dividend.

Keywords: *Skills, Human Capital, Demographic Dividend, PLFS, NCO, Geoda, Natural Break Maps.*

1. Introduction

India is currently placed at a favourable demographic situation with half of its population being less than thirty years of age. While this makes India the youngest nation in the world, it has immense importance for India's growth process in a global setting where most countries are experiencing population ageing. However, India's ability to harness this demographic advantage and turn it into an economic dividend will depend critically on education and skill levels of its youth workers (Dey and Devi, 2019). This is because the productivity of workers is critically dependent on education, training and skills which form an inalienable part of human capital of a nation. The theoretical underpinning of the importance of education and skills in the growth process is provided by the endogenous growth theory which posits that economic growth arises from within a system and is driven by internal factors like human capital, innovation, and investment. Romer's 1986 model highlights the role of knowledge creation in long-term growth through investment in research technology. Lucas (1988) focuses on human capital, noting its spill over effects in boosting productivity. Romer's 1990 model stresses the importance of ideas in economic progress, while Pyatt & Becker's (1966) human capital theory underlines the role of education and training in increasing productivity and competitiveness. Additionally, in the human development approach, human capital is seen as being an end in itself rather than a means to an end (Streeten, 1994). Given the importance of education, skill formation and training for enhancing individual welfare and for achieving the overarching objective of transforming India into a developed nation by 2047, there has been much talk in both academic and policy circles on the need to upscale the skill level

of workers and bridge the skill gap. Against this backdrop the current research uses unit level data available from the Periodic Labour Force Survey (PLFS), 2022-23 to assess the skill levels of workers in India and to evaluate the relation between skills and earnings. The objectives of the article may be stated as follows: a. To assess the current skill levels of workers in India and examine the variations across states. b. To analyze how skill levels of workers vary by place of residence and across different social groups. c. To evaluate the impact of skills on workers' earnings.

2. Data Source and Methodology

The study is based on the secondary data**.** Unit level data available from PLFS, 2022-23 has been utilised in the study. The research focuses on the skill level of workers in the age group of 21-59 years. The number of workers in this age group in the data set was 1,48,599. Here, it may be noted that in PLFS of 2022-23, the skill level of workers were identified on the basis of the methodology adopted in the National Classification of Occupations (NCO) of 2015. The classification of skills in NCO (2015) is primarily based on the educational categories and levels, which appear in the International Standard Classification of Education (ISCED). Accordingly, four skill levels have been identified. Skill Level I comprises of workers who have up to ten years of formal education and/or informal skills. Skill Level II consists of workers with 11-13 years of formal education. Workers with 14-15 years of formal education are grouped under skill level III while those with more than 15 years of formal education are categorised under skill level IV. On the basis of the above classification, different occupations were categorised into nine divisions as shown in Table 1. Legislators, Senior Officials, and Managers belonging to Division 1 however were not allotted to any skill level. Hence, workers belonging to Division 1 were not included in the study. The pruned data set consisted of 1, 41, 945 workers from both rural and urban areas. Using the definitions outlined above, workers were grouped into the four skill levels on the basis of their occupational divisions given in the PLFS data

Table 1: Division of occupations by skill level of workers		
Divisions	**Occupations**	**Skill Level**
1	Legislators, Senior Officials, and Managers	Not Defined
2	Professionals	IV
3	Associate Professionals	III
4	Clerks	II
5	Service Workers and Shop & Market Sales Workers	II
6	Skilled Agricultural and Fishery Workers	II
7	Craft and Related Trades Workers	II
8	Plant and Machine Operators and Assemblers	II
9	Elementary Occupations	I

Source: NCO (2015)

Both descriptive as well as econometric techniques were used to analyse the data. Natural break maps were constructed using GeoDa software to assess the distribution of workers across Indian states according to the level of skills. Here, it may be mentioned that apart from classifying workers by NCO 2015 divisions, the PLFS also classified workers by type of employment . viz. own account workers, employers, unpaid family workers, salaried workers, workers engaged as casual daily wage workers in MNREGA and other casual daily wage workers. However, earnings were reported only for regular wage/salaried workers and those in self-employment. Hence, for evaluating the impact of skills on earnings, only these two groups of workers were considered for the regression analysis viz. regular wage/salaried workers and self-employed workers. In order to ascertain how skill levels of workers impact on earnings, a multiple linear regression model was fitted as follows:

$$Y_I = \alpha + \beta_i X_i + \mu_i$$

Where Y_i denotes the earnings received from regular wage/ salaried/self employment, Xi are the explanatory variables, is the

stochastic error term and α and β's are parameters to be estimated. The description of the explanatory variables used in the study is given in Table 2.

Table 2: Description of explanatory variables used in regression analysis

Variable	**Description**
AGE	Age of the worker (in completed years)
SEX	Sex of the worker (= 1 if male, 0 otherwise)
ST	Caste dummy (=1 if Scheduled Tribe, 0 otherwise)
SC	Caste dummy (=1 if Scheduled Caste=1, 0 otherwise)
OBC	Caste dummy (=1, if belonging to Other Backward Caste, 0 otherwise)
SECTOR	Sector dummy (1 =if rural, 0 otherwise)
TRAINING 1	Dummy for training (=1, if received training on the job, 0 otherwise)
TRAINING 2	Dummy for training (=1, if received part time training, 0 otherwise)
TRAINING 3	Dummy for training (=1, if received full time training, 0 otherwise)
SKILL LEVEL 2	Dummy for skill (=1, if worker with 11-13 years of formal education)
SKILL LEVEL 3	Dummy for skill (=1, if worker with 14-15 years of formal education)
SKILL LEVEL 4	Dummy for skill (=1, if worker with more 15 years of formal education)

Source: Authors

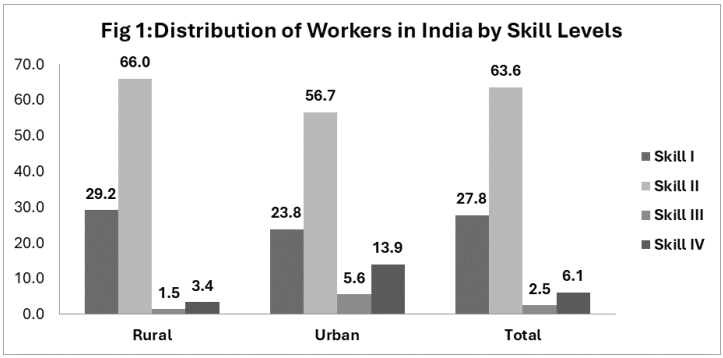
3. Analysis and findings:

The results of the data analysis have in organised in two sub-sections. The descriptive statistics are presented in Section 3.1 while the results of econometric analysis are reported in sub-section 3.2.

3.1 Findings from Descriptive analysis

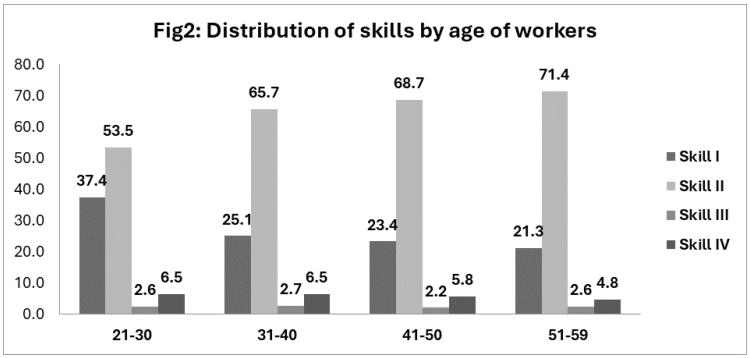
Fig 1 illustrates the distribution of workers in India across various skill categories, as outlined in Section 2. It can be seen

that approximately 28 percent of workers aged 21-59 fall into Skill Category I, which represents the lowest skill group. A significant portion, around 64 percent, belongs to Skill Group II. Together, these two groups account for a substantial 91 percent of the workforce in India. The proportion of workers in the higher skill categories is less than 10 percent. When categorized by place of residence, 95 percent of workers in rural areas belong to the two lowest skill groups, while in urban areas the figure is around 81 percent. Therefore, although workers in urban areas generally possess higher skill levels compared to those in rural areas, there remains considerable potential for skill development even within urban sectors. It may further be noted that when access to vocational training is considered, less than 5 percent of the workers in the study had access to any kind of vocational training.

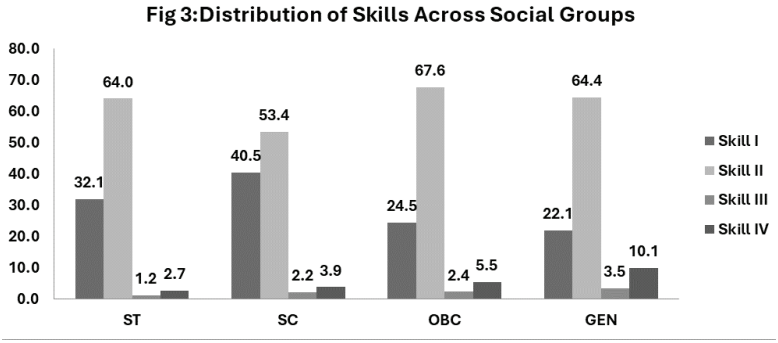


Source: Based on authors' calculation from PLFS (2022-23) data

Fig 2 depicts the skill levels of workers across different age groups. It is clear from the data that older age groups have a higher proportion of workers in Skill category II. However, it is concerning that the youngest group of workers shows the highest percentage in the lowest skill category i.e. Skill I. With 90 percent of young workers engaged in low-skilled jobs, realizing the demographic dividend appears to be a distant goal. While this presents a discouraging picture of the skill levels among young workers in India, it also highlights the significant economic potential that could be unlocked if this group were adequately trained and equipped with the necessary skills for the labour market.



Source: Based on authors' calculation from PLFS (2022-23) data



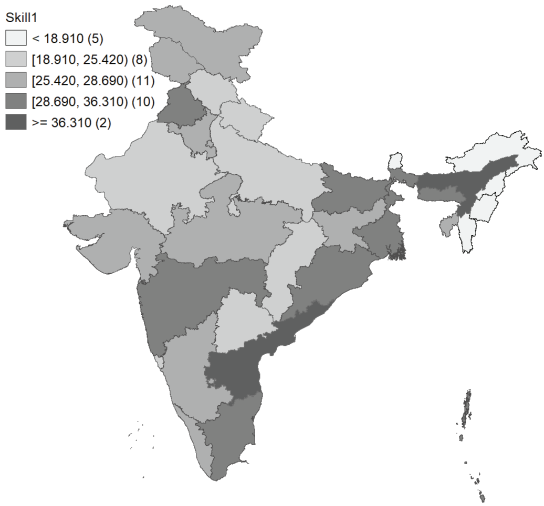
Source: Based on authors' calculation from PLFS (2022-23) data

Fig 3 illustrates the differences in skill levels across various social groups. A close examination of the data shows that SC, ST, and OBC workers are behind general category workers in skill formation. Specifically, when considering the first two skill levels (Skill I and Skill II) together, the percentage of ST, SC, and OBC workers in these lower skill categories is 96.1 percent, 93.9 percent, and 92.1 percent, respectively. In comparison, about 86.4 percent of workers from the forward castes fall into these categories. As a result, less than 10 percent of ST, SC, and OBC workers belong to the higher skill groups (Skill III and Skill IV), while 13.6 percent of general caste workers have higher skill levels. Although these figures indicate that ST, SC, and OBC groups are lagging behind forward castes in skill acquisition, the situation among the forward castes is only marginally better. This highlights the urgent need

to promote skill development not only among marginalized communities but also within forward groups.

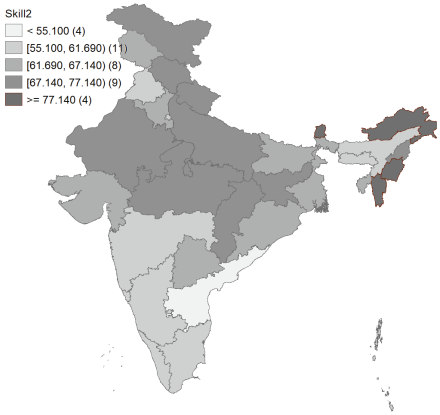
We now turn our attention to the inter-state variation in the distribution of skilled workers across the country. For this purpose workers residing in each state have been categorised into four categories according to their skill levels. The Natural Break maps that were constructed using GeoDa software grouped the states into five categories on the basis of the observed differences in the proportion of workers in each skill category. Accordingly, four Natural Break maps were created, one for each skill group. Taking Skill I which is the lowest skill category, it is found that Assam and Andhra Pradesh have the highest proportion of workers in this group (Fig 4). In both these states, the proportion of workers belonging to the lowest skill category is more than 36 percent. States with the second highest proportion of workers in skill category I are Meghalaya, West Bengal, Maharashtra, Tamil Nadu, Punjab, Bihar and Odisha. Surprisingly, the five North Eastern states of Sikkim, Arunachal Pradesh, Nagaland, Manipur and Mizoram have the lowest proportion of workers with low skill levels. In each of these states the proportion of low skill workers in the overall workforce is less than 20 percent.

Fig 4: Inter-state variation in proportion of workers belonging to Skill Category I



Source: Based on authors' calculation from PLFS (2022-23) data

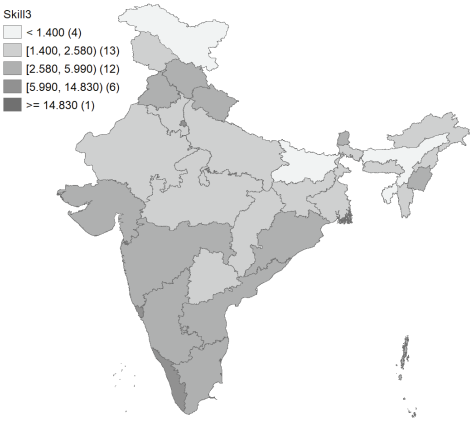
Fig5: Inter-state variation in proportion of workers belonging to Skill Category II



Source: Based on authors' calculation from PLFS (2022-23) data

Fig 5 represents percentage of workers in skill category II in different states and UTs. The North-Eastern states of Arunachal Pradesh, Manipur, Sikkim and Mizoram have the highest proportion of workers with Skill Level II. The states of Rajasthan, UP, Madhya Pradesh also have high concentration of workers in this skill category.

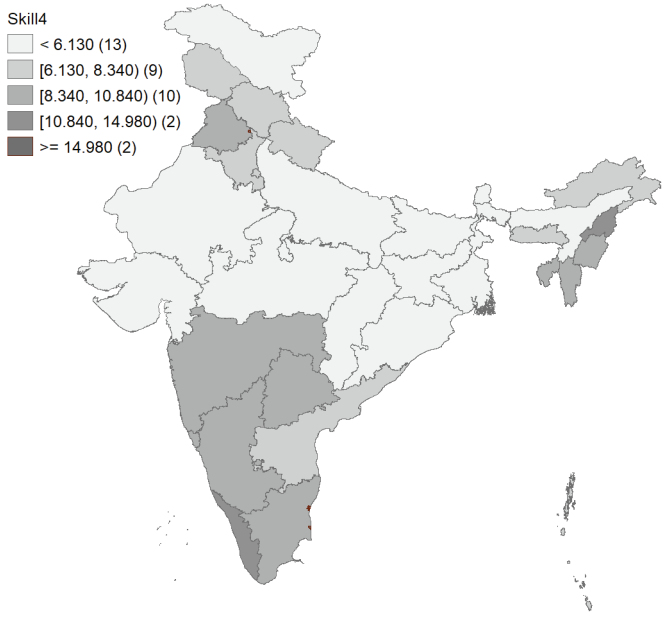
Fig 6: Inter-state variation in proportion of workers belonging to Skill Category III



Source: Based on authors' calculation from PLFS (2022-23) data

Fig 6 illustrates the percentage of workers in skill category III, with the Union Territory of Chandigarh having the highest proportion of workers in this category. It is evident that the Southern and Western states have a relatively higher percentage of workers in this skill group, while Assam, Tripura, Bihar, and Ladakh show a significantly lower concentration of workers with this skill level. The poor performance in Assam and Bihar may be partly due to the migration of better-skilled workers to other states in search of improved opportunities. However, the urgent need for skill enhancement among local workers in these states cannot be overlooked. Only through increased skill development can the per capita income gap between states be narrowed, thus achieving the goal of inclusive development.

Fig 7: Inter-state variation in proportion of workers belonging to Skill Category IV



Source: Based on authors' calculation from PLFS (2022-23) data

Figure 7 presents the state-wise distribution of workers in skill category IV. Notably, the Union Territories of Puducherry and Chandigarh form a distinct group, with more than 14 percent

of their workers in this category. Kerala and Nagaland follow closely, with over 10 percent of their workers belonging to the highest skill group. The southern states of Tamil Nadu, Karnataka, and Telangana, along with the North-Eastern states of Manipur, Mizoram, and Tripura, as well as Maharashtra and Punjab, occupy the third tier in the hierarchy shown by the natural break maps. It is concerning to observe that in central India, as well as in Gujarat, Ladakh, and Assam, the proportion of workers in skill category IV remains dismally low, below 6 percent.

3.2: Impact of skills on earnings: Findings from econometric analysis

Table 3 reports the results of the linear regression model that was fitted to analyse the factors which determine earnings from regular wage or salaried employment. A total of 40,351 individuals who were employed as salary earners or regular wage earners in the calendar month leading preceding the survey were considered for the purpose of estimation. Workers who received earnings by way of both salaried and self-employment were not considered. It is observed from the results presented in Table 3 that remuneration received by way of salaries or regular wages increases with increase in the age of the worker; this is expected as scope for career advancement and promotions are likely to increase with age. Again, male workers are likely to earn more than female workers. This could be because female workers may face entry barriers to better paying jobs on account of differences in educational opportunities. Caste also influences earnings from salaried employment. However, the impact is not uniform across all caste groups. Compared to workers belonging to the general caste, ST works tend to earn more by way of salaries. This could be due to higher levels of education prevalent among ST workers particularly in the North-Eastern states. In contrast, SC and OBC workers tend to earn significantly lower amounts compared to forward caste workers. Again, earnings from salaried employment tend to be lower in rural areas as compared to urban areas. Compared to workers with no vocational training, those with any kind of vocational training tend to earn better wages and salaries; such wages could be considered to be an economic rent for undergoing vocational training either on the job or outside it. Considering, Skill Level 1 as the base category, it follows from the

regression results that pecuniary returns from wage employment increase linearly with improvement in skill level of workers. Not only are the coefficients associated with different skill levels positive and significant, the size of co-efficient increases with improvement in skill base. Thus, on an average, a worker with skill level II earns INR 4415 more from wage employment every month compared to a wage earner with skill level I. Similarly, workers with skill level III and IV on an average earns INR 11, 541 and INR 20,643 more than the lowest skilled wage earner. The F statistic is highly significant indicating that the estimated regression equation provides a good fit to the observed data.

Table 3: Factors which impact on earnings from regular wage or salaried employment

Variables	Coefficient	t	P>|t|
AGE	430.86***	56.61	0
SEX	7634.97***	42.39	0
SC	-2985.21***	-13.04	0
ST	1387.49***	5.33	0
OBC	-2197.47***	-12.03	0
SECTOR	-4413.59***	-27.32	0
TRAINING1	8502.32***	18.43	0
TRAINING2	1884.11***	3.66	0
TRAINING3	3227.09***	10.49	0
SKILL LEVEL II	4415.00***	19.21	0
SKILL LEVEL III	11541.10***	34.71	0
SKILL LEVEL IV	20642.98***	77.78	0
CONSTANT	-6863.31***	-17.14	0
No. of observations	40351		
F(12, 40,338)	1357.05***		

*** denotes significant at 1 percent level of significance

Source: Based on authors' calculation from PLFS (2022-23) data

The determinants of earnings from self-employment are reported in Table 4. The analysis was carried out for 50,261 individuals who earned their livelihood solely by way of self-employment.

A scrutiny of the results reveals that barring the effect of ST, the impact of all other variables on the outcome is similar to the model presented in Table 3. It is found that workers belonging to all caste categories including ST tend to earn less from self employment compared to the forward caste workers. Again, male workers tend to earn more than female workers from self-employment which is again not a surprising find given that women generally lag behind in terms of access to credit or managerial skills. The sign of the remaining variables are along expected lines. Thus, with every increase in the age of the workers, earnings are predicted to be higher, holding all other variables constant. Self-employed workers in urban areas on an average are predicted to earn INR 4282 more on a monthly basis compared to their rural counterparts. Workers who received training on the job are expected to earn INR 3348 more from self employment activities compared to workers without any formal training (base category). Further, workers who received full vocational training are expected to earn INR. 1493 more compared to those in the base category. The coefficient for part time vocational education although positive is not statistically significant. For analysing the impact of skills on earnings from self employment, the lowest level of skill i.e., skill I has been treated as the base category. Thus, workers with skill level II on an average earn Rs. 3670 more compared to workers with the lowest skill level. Similarly, workers with skill level III and skill level IV respectively earn Rs. 11726 and Rs. 8924 more than workers belonging to the lowest skill category.

Table 6: Factors which impact on earnings from self-employment

Variables	**Coefficient**	**t**	**P>|t|**
AGE	51.39***	13.03	0
SEX	8151.29***	90.26	0
SC	-2468.97***	-19.82	0
ST	-1291.31***	-10.85	0
OBC	-1372.04***	-14.57	0
SECTOR	-4282.12***	-51.42	0
TRAINING1	3348.25***	4.45	0
TRAINING2	451.44	1.26	0.208
TRAINING3	1493.85***	5.89	0

SKILL LEVEL II	3689.69***	16.95	0
SKILL LEVEL III	11725.56***	32.03	0
SKILL LEVEL IV	8924.28***	29.37	0
CONSTANT	4793.16***	16.64	0
F(12, 50,248)	1260.27***		
*** denotes significant at 1 percent Source: Based on authors' calculation from PLFS (2022-23) data			

4. Summary and Conclusion

The study evaluates the current skill levels of Indian workers based on nationally representative data. Using the standard skill definitions outlined in NCO 2015, the findings show that the majority of Indian workers possess low skill levels, with over ninety percent falling into the two lowest skill categories. Also, less than 5 percent of the workers had access to any form of vocational training .While urban areas exhibit a greater proportion of workers with higher skill levels compared to rural regions, the statistics for urban sectors are still concerning. Despite the notion of a demographic dividend, the age-based segmentation of workers presents a troubling picture, as the youngest age group does not appear to have an advantage in skill acquisition over older groups. Similarly, while workers from forward castes tend to have better skill acquisition compared to marginalized groups, there is still significant potential for skill development within the forward caste population. The critical role of education and vocational training for realising the demographic divided cannot be overstated. Regression analysis of unit-level data highlights that both salaried and self-employed earnings are significantly and positively impacted by access to training and higher skill levels. Given the concerning state of vocational education coverage and the low skill levels among Indian workers, urgent policy actions are necessary to enhance skill development and increase access to vocational training. Attention must also be given to bridging the disparities in skill attainment across states. Addressing the skill gaps is crucial to fully leveraging India's demographic dividend before the opportunity window closes due to demographic shifts. The age structure of the Indian population will inevitably change, and it is essential to capitalize on the benefits of a young and

dynamic workforce before population aging begins to affect the economy.

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(Endnotes)

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