IMPACT OF PRADHAN MANTRI AWAAS YOJANA -GRAMIN (PMAY-G) ON INCOME AND EMPLOYMENT

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Executive Summary

Providing shelter for poor has been a colossal challenge for India, and the problem is more prominent in rural areas. Various international resolutions such as International Covenant for Economic, Social and Cultural Change Rights, Vancouver Declaration on Human Resettlements, etc., have recognized adequate housing as a part of the right to an adequate standard of living. In 1985, Indira Awaas Yojana (IAY) was launched to provide houses for SCs/STs and freed bonded labours, and later extended to non- SCs/STs families. In an effort to overhaul the program and for accomplishing its target 'Housing for all by 2022', IAY was restructured and transformed into Pradhan Mantri Awaas Yojana-Gramin (PMAY-G) in April 2016 to provide a *pucca* house, with basic amenities like piped drinking water, electricity connection, and Liquefied Petroleum Gas (LPG) connection by convergence of different schemes and programmes run by the government to all homeless and those households living in kutcha and dilapidated houses by 2022.

The selection of PMAY-G beneficiaries is based on the Socio-Economic Caste Census (SECC) 2011. The beneficiaries are provided with the unit assistance of Rs 1.20 lakh for plain areas and Rs 1.30 lakh for the hilly, difficult, and Integrated Action Plan (IAP) areas, and the funds are transferred digitally directly to the account of the beneficiary. Apart from the unit assistance, they are entitled to 90-95 days of employment under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and Rs 12,000 for constructing toilets under Swachh Bharat Mission (SBM). Some states do have their own additional benefits added to this program. Above all, the scheme also helps the beneficiary to mobilise upto Rs.70,000 as loan from the formal financial system.

In this report, an attempt has been made to understand the extent of houses sanctioned and constructed, and its impact on two major macro parameters: employment and income. As the construction in general and rural housing, in particular, is expected to have strong forward linkage with other sectors in the economy, the impact on employment and income can be through direct as well as indirect channels. This report looks at both direct and indirect impacts on employment and income for the years 2016-17 and 2017-18 by taking both completed and under construction houses. In the case of 2017-18, the analysis is limited upto March 05, 2017.

The direct impact on the employment generation is assessed using the labour input (person days) requirement from two selected designs given in the PAHAL(A compendium of Rural Housing Typologies' which consists of more than 100 designs for 15 states). On the other hand, the Input-Output(IO) Analysis is used for assessing both the direct and indirect impact of PMAY-G houses on the macro-economic parameters i.e., income and employment. The updated IO table 2009-10 of Munjal et al. (2014) which is based on the CSO IO table 2007-08 is used for the benchmark estimates.[1]

Although PAHAL designs are only suggestive in nature, it does give a broad perspective on the size and design of the houses that can be constructed in the rural areas, approximate cost of labour, and materials required for construction. As the scheme has two broad categories (plain and hilly/IAP), two designs are selected to represent these categories accordingly.One design from Bihar as a representative of plainareas and one design from Assam as a representative of hilly/IAP areas are chosen for operational purpose in the current analysis. Since the average cost for construction of PMAY-G house per square meter does not vary much across the different designs and States, selection of one design or State for estimating the materials and manpower required is assumed to represent the country as a whole, and thus, the variation is assumed to be not significant at the macro level. Given that PAHAL does not provide the disaggregated data, a few assumptions were made for estimating the value of materials and labour.

The completed houses and houses under constructionunder PMAY-G tillMarch 05, 2018 is around 23.52 lakh and 21.28 lakh respectively. The total financial support provided to the beneficiaries by the government is Rs 1.47 lakh and Rs 1.59 lakh in plain areas and hilly areas respectively. This includes MGNREGS wage contribution and contribution for the toilet under SBM. In addition to this, the beneficiaries' contribution in the form of labour/ expenses on other construction related materials is expected to be Rs. 69-75 thousand per house as per the selected designs of PAHAL. This amount is translated to be 31-32 percent of the total cost of the houses. The total expenditure on PMAY-G houses is estimated to be Rs. 35135 crore upto March 05,2018.

In terms of employment, construction of a PMAY-G house in hilly/IAP district generated 48 person days of skilled labour and 105 person days of unskilled labour.[2] The

[1]Munjal, P., Gupta, D. B., Bhide, S., &Kolli, R. (2014). Study on Impact of Investment in the Housing Sector on GDP and Employment in Indian Economy. NCAER Research Report submitted to Ministry of Housing and Urban Poverty Alleviation. Government of India.

[2] The skilled and unskilled labour implies masons and construction workers respectively.

estimates for the plain areas appeared to be 75 person days and 92 person days of skilled and unskilled labour respectively. Considering the total houses completed upto March 05, 2018, the current estimate of employment potentials based on PAHAL designs is found to be 40.07 crore person-days. Of this, nearly 16.04 crore person-days are from skilled labour and the remaining 24.03 crore person-days are from the unskilled labour force in two years.For houses under-construction, the total employment generatedfor both the years turns out to be 4.82 crore for skilled labour and 7.60 crore person days for unskilled labours till March 05,2018.

The report also attempts to estimate the total direct demand for construction materials such as bricks,cement, and steel due to implementation of PMAY-G programme. The additional demand for bricks is estimated to be at 3063.14crores (in numbers) during the last two years. Similarly, the addtiional demand for cement is 23.61 crore bags, steel is 1.75 crore quintals, and sand is 3.95 crore cubic meter. Such increase in the input demand has also implications on the additional job creation (indirect employment) in the economy. The increased demand for the construction-related materials has generated 2.16 lakh additional jobs in the economy. About 57 thousand additional jobs havebeen generated each in bricks and cement industry. Similarly, about 58 thousand jobs havebeen created in the iron and steel industry due to increased demand for GCI sheets and steel.

By using the Input-Output tables, the current analysis reveals that the cumulative expenditure onPMAY-G would have generated 94.53 lakh additional jobs (both direct and indirect) in the economy due to the inter-sector linkages. Out of this, 83.35 lakhare directly employed in the residential construction sector. This translates to an increase in the total employment by 1.77 percent. In terms ofgross value addition (GVA), the PMAY-G expenditure is expected to increase the overall GVA by 0.55 percent.Further, the total investment in PMAY-G gives an equivalent increase in the demand for residential construction and is expected to increase the production of residential construction by 22.67 percent. The overall production in the economy increases by 0.65 percent due to the inter-sector linkages.

Considering the fact that the beneficiary contribution varies both in terms of quantum and beneficiaries' affordability, an attempt is also made to estimate the impact of PMAY-G on direct employment and output under three different scenarios of beneficiary contribution. The first scenario assumes no additional contribution from the beneficiary, the second scenario assumes beneficiary contributes Rs 35000, and finally,the third

scenario assumes that beneficiary contributes Rs. 70,000.The direct employment generated in case of the unskilledcategory under three scenarios varies from 20.36 core person-days under first scenarioto 25.10 crore person-days under second scenarioand 29.84 crore under the third scenario. Similarly, the estimated numbers for skilled labour force are 14.50 core, 17.90 crore,and 21.30 crore respectively. In the case of output, theestimates suggest that output could have increased by 0.43, 0.53 and 0.63 percent respectively, in three different scenarios. In terms of both direct and indirect employment, the total additions to the employment under three scenarios are estimated to be 63.31 lakh jobs (1.18%), 78.05 lakh jobs (1.46%) and 92.78 lakh jobs (1.73%), respectively.

In a nutshell, the current analysis reveals that the PMAY-G housing scheme would have had a substantial impact on employment and income generation in the economy.However, the analysis done in the report has its own limitations. First, the cost-estimation for the current analysis is done based on the PAHAL designs, but these are suggestive in nature. Second, beneficiaries' contribution is calculated based on the available designs, and the three different scenarios were considered on the basis ofthe provision of institutional finance of Rs 70,000. However, the actual contribution could vary.

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Section 1: Introduction

Providing shelter for poor has always been a challenge for Indiaand the problem is more prominent in rural areas. Various international resolutions such as United Nations Declaration of Human Rights, International Covenant for Economic, Social and Cultural Change Rights, Vancouver Declaration on Human Resettlements, etc., have recognized housing as a part of the right to an adequate standard of living. Though the Indian Constitution does not directly guarantee the 'Right to Housing' but has addressed the importance of shelter through Directive Principle of State Policy (DPSP) and fundamental rights and duties that have a bearing on the right to adequate housing. To address the issue of severe scarcity of houses for the rural poor and empowering them, the rural housing programme was first taken up during the Second Five Year Plan (FYP) and was carried on in subsequent FYPs. Recognizing the need and significance of easy access to housing for deprived is of utmost importance and to fulfil the objective of providing shelter to all, India, in June 1996, became a signatory to the Istanbul Declaration on Human Settlement.

In 1985, Indira AwaasYojana (IAY) was launched as a sub-scheme of Rural Landless Employment Guarantee Programme (RLEGP) and later as a sub-scheme of JawaharRozgarYojana (JRY) to provide houses for SCs/STs and freed bonded labours and were later extended to non- SCs/STs families. However, IAY was delinked from JawaharRozgarYojana (JRY) and was made an independent scheme in 1996 (NIPFP, 2015). The current government, in an effort to overhaul the program and for accomplishing its target of 'Housing for all by 2022', IAY was restructured and transformed into Pradhan Mantri Awaas Yojana- Gramin (PMAY-G), for fulfilment of gaps identified in IAY as outlined in the report of "the Comptroller and Auditor General (CAG) on Performance Audit on IAY" (CAG, 2014), and the report on "Unspent Balances and Flow of Fund Mechanism under Some Rural Development Schemes" (Bhanumurthy et al., 2015).Being the world's largest programme for rural poor[3], it aims to provide a *pucca* house, with basic amenities such as piped drinking water, electricity connection, and Liquefied Petroleum Gas (LPG) connection by convergence of different schemes and programmes run by government to all homeless and those households living in *kutcha* and dilapidated houses by 2022. The Ministry of Rural Development (MoRD), for proper

[3]http://www.in.undp.org/content/india/en/home/operations/projects/poverty reduction/ruralhousing.html

and effective implementation of the programme and construction of quality houses, has issued General Guidelines and Housing Designs -PAHAL. In its first phase, it aims to construct one crore houses by 2019, and the beneficiaries will be selected through Socio-Economic Caste Census (SECC) 2011. The beneficiaries are provided with the unit assistance of Rs 1.20 lakh for plain areas and Rs 1.30 lakh for the hilly, difficult, and Integrated Action Plan (IAP) areas, and the funds are transferred digitally directly to the account of the beneficiary from the Single Nodal Account established at the State level. Apart from the unit assistance, they are provided with the option of availing institutional finance up to Rs 70,000 and are entitled to 90-95 days of employment under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Rs 12,000 for constructing toilets under Swachh Bharat Mission, etc. In addition to these benefits, the beneficiaries are endowed with a number of other support services such as training to masons and skill certification for the good quality construction of the houses, sourcing of construction material, support to old and disabled beneficiaries in getting the house constructed, development and provision of house design topologies, etc.[4]

The guidelines issued by the MoRD affirms that for the construction of one crore houses under the PMAY-G by 2018-2019, the total allocation of Rs 1, 30,075 crore is sanctioned. The cost is to be shared between Government of India and State Governments in the ratio of 60:40 for general category states and 90:10 for special category states and IAP Districts. The Government of India provides the full cost in respect of Union Territories (UTs).

Unlike the minimum size of the house mentioned in IAY to be 20 square metre, the minimum size of the PMAY-G house is increased, and it is estimated to be 25 square metre including a dedicated area for hygienic cooking. Further, a beneficiary is also eligible for a financial assistance of Rs 12,000 from Swachh Bharat Mission and MGNREGS or any other dedicated financing source for the construction of a toilet. Furthermore, for PMAY-G to operate in a transparent manner, ensure quality and timely construction of the houses, monitoring of physical progress of the construction is done with the help of AwaasSoft[5] at the level of both Government of India and by State/UT Government. National Technical Support Agency (NTSA) acts as the nodal agency to assist in facilitating the same.Various Governance reforms such as Direct Benefit Transfers (DBT) through digital payments, e-monitoring through AwaasSoft, masons training, convergence, providing of housing typologies, and setting up of technical

[4]Guidelines, pg. 35, MoRD (2016)

[5]AwaasSoft is an end to end e-governance model and it is work –flow enabled, web-based electronic service delivery platform. All critical informationrelated to programme implementation and monitoring of PMAY-G are made available to the public through AwaasSoft.

support agencies at State and Central level is expected to help in speedy completion of houses. This is also expected to create additional employment and income generation at rural level.

In this study, an attempt has been made to estimate the impact of PMAY-G in generating additional employment and income since the scheme is revamped (i.e., 2016-17). For this, as the impact of the scheme on employment and income could be direct as well as indirect (through cascading effect on other sectors), the estimation is done under two stages. In the case of direct effect, the study uses PAHAL designs provided at the State level, and the details are provided in section 2. For indirect effects, the study uses Input-Output tables, and the results are presented in section 3.

Section 2: Overall Details of Housing Designs

Unlike in IAY (Indira AwaasYojana), techno-managerial support for the construction of houses under Pradhan MantriAwaasYojana-Gramin (PMAY-G) is a significant feature. The Ministry of Rural Development (MoRD) has published two volumes of 'PAHAL- A compendium of Rural Housing Typologies' which consists of more than 100 designs for 15 states. 'PAHAL' is considered as guiding resource and a ready reckoner for the stakeholders of PMAY-G to construct affordable, functional, durable and disaster resilience houses for the beneficiaries. The process of developing the designs in PAHAL is undertaken by UNDP and Indian Institute of Technology, Delhi, under the guidance of MoRD through the technical support from Housing and Urban Development Corporation (HUDCO). However, the validation of the designs was carried by Central Building Research Institute (CBRI), Roorkee. 'PAHAL' is an outcome of the detailed studies of the place and consultative process with the rural communities, government stakeholders at different levels and civil societies. Thus, the resultant design is a blend of conventional construction materials (e.g., cement, bricks, and sand) and technology with locally available materials (e.g., clay and stone). Besides incorporating disaster resilience features and introduction of reinforcement in masonry works, the features of traditional housing are also included in designing the housing typology. In line with this combination, different housing zones are identified for each state based on the availability of local materials and technology, vulnerability to disaster, existing community skills, knowledge, culture and building tradition (PAHAL, 2017). However, PAHAL designs are only suggestive in nature, and these are not mandatory on the beneficiary. But it gives us a broad perspective on the size and design of the houses that can be

constructed in the rural areas, approximate cost of labour, and materials required for construction.

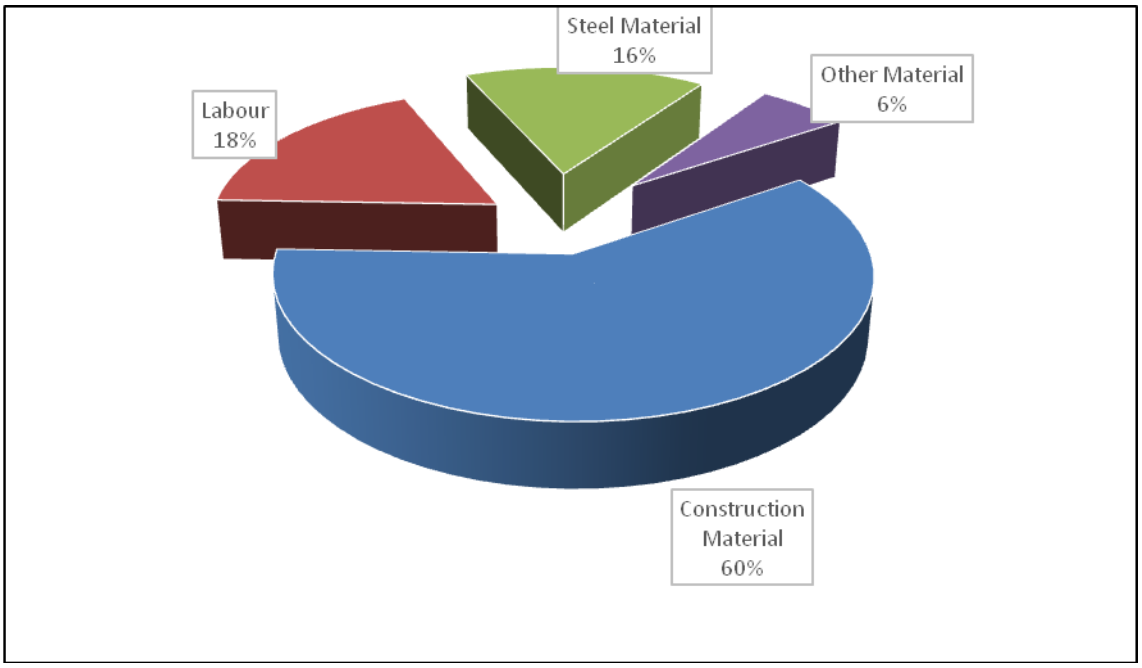
The cost structure and the components of materials and labour used for these designs are almost similar across the States that are in plain areas. Hence, for our analysis, we consider one design for estimating the requirement of material and labour for constructing a rural house, and the same is used for estimating the income and employment effects at the national level for non-hilly States. The preliminary and limited details about the work and inputs needed for all three stages of the building (foundation, super-structure, and roofing) are given in PAHAL. For a few States such as Bihar, the detailed material break-up is given with the quantity required for the overall work of the house. But for many designs, the details about the materials and labour break-up are not provided. Necessary adjustments have been made to arrive at the required value for the analysis, and this will be explained in next sub-section.

2.1 Overview of the Estimation Given in PAHAL

Based on PAHAL, some discussion on the cost estimations are provided in this sub-section. PAHAL gives more than 100 designs, and,based on these designs, a broad estimation of cost for each component is presented in Figure 1. However, these estimations could change, although marginally, depending on the designs. It is also important to note that the cost of most of the designs provided in PAHAL exceeds the amount provided in the scheme. Similarly, the area exceeds the minimum requirement area of 25 sqm set by the scheme (PAHAL, 2017a, 2017b). In case of some designs, they also provide details of transportation and electrical cost. To cite some examples, the transportation cost is 12 percent of total cost in design ML-01 for Meghalaya, and the electrical cost is approximately 8 percent to total cost in design MN-01 A for Manipur (PAHAL, 2017b).

The cost composition from Figure 1 indicates the share of various inputs, including labour, in constructing PMAY-G houses. Despite the fact that the shares given in the figure are derived from general discussions with civil engineers, this helps in further analysis on the contribution of the scheme on different sectors of the economy. Overall, the composition of materials used and the workforce employed does not vary much across the designs and States.

Figure 1: Composition of cost inPMAY-G house



While most of the designs do not provide details with regard to inputs, here for further analysis, we have taken the design that has some information about the materials and labour cost break-up. After selecting the State based on the available information, one design is selected based on geographical location.[6]For the plain area, we have selected a design from Bihar, and in the case of a hilly region, one design from Assam is chosen. Since the average cost for construction of PMAY-G house per square meter does not vary much across the different designs and States, selection of one design or State for estimating the materials and manpower required assumed to represent the country as whole, and thus, the variation is assumed to be not significant at macro level. Details of the selection and necessary adjustments are explained in the next sub-section.

2.2. Estimation of Required Material and Labour for Selected Design (For Plains)

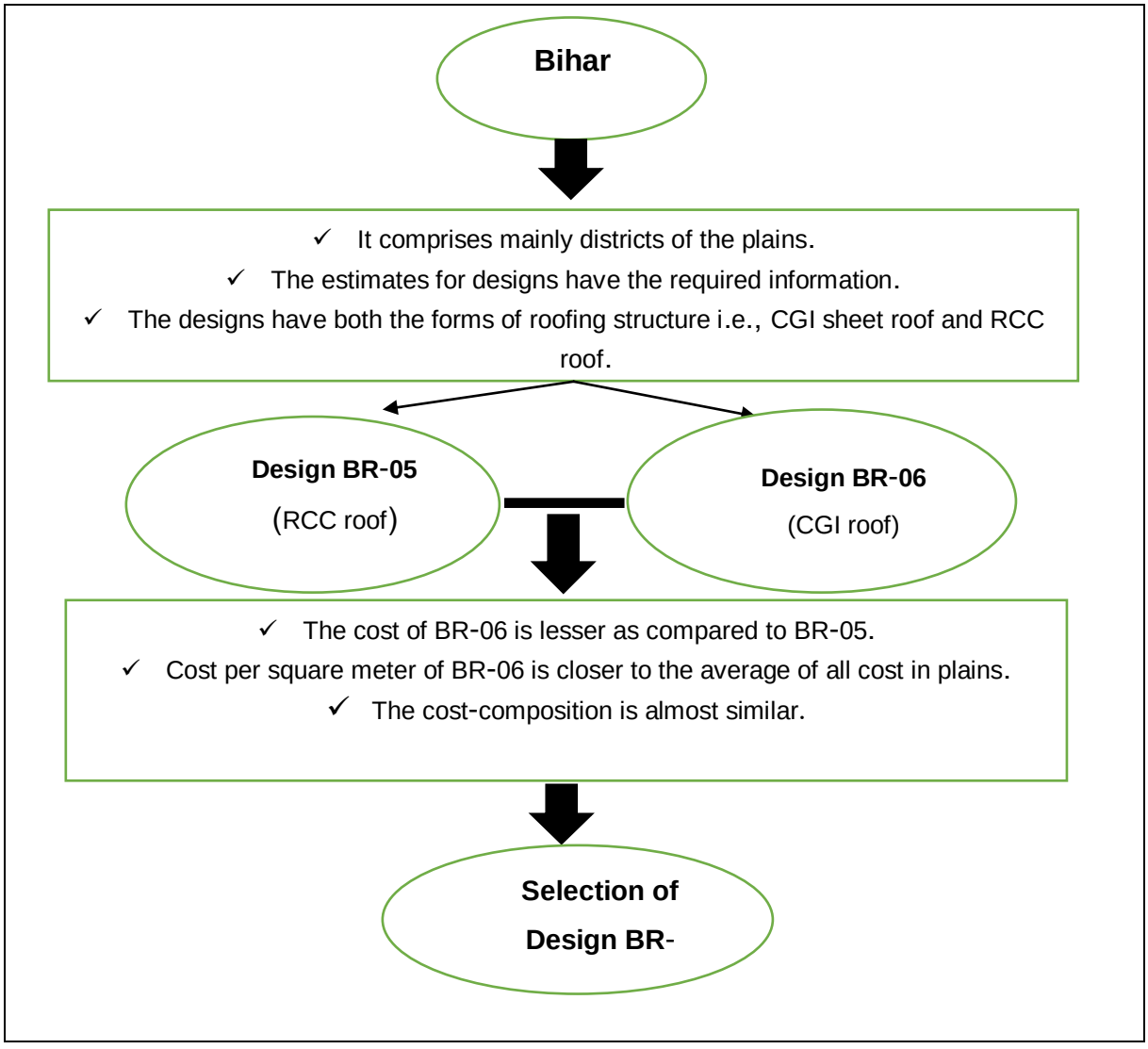
With reference to PAHAL (Volume II), designs BR-05 and BR-06 are selected for estimating the materials and labour break-up for the plains. As per the information provided in the document, the Zone C of Bihar comprises of districts in the plains. Hence,

[6] There are two broad categories of grants: 1.3 lakh and 1.2 lakh. All hilly, difficult and IAP areas are entitled for 1.3 lakh assistance whereas all other areas and plain are entitled for 1.20 lakh.

the designs selected are expected to be representative for the plains of other regions of India in terms of materials and labour requirement.

It is observed that there are mainly two forms of roofing in the design; with RCC (Reinforced Cement Concrete) roof and with CGI (Corrugated Galvanised Iron) sheet. Therefore, the selection of two designs is done to capture the variation in building structure within the plains (Figure 2).

Figure 2: Selection of Design for Bihar



2.2.1 Details about Housing Typology of the Selected Design:

Both the designs BR-05 and BR-06 belong to Zone C, which is not very prone to floods. Bricks and bamboo are the common materials used for construction in this area. Detailed estimates after the necessary adjustments are given below for both the designs.

Table 2.1: Estimation for the Selected Design

			ZONE-C-RCC Roof (BR 05)		ZONE-C-CGI Roof (BR 06)	
Area of the House:			33.18 sq.m		33.18 sq.m	
Material	**Unit**	**Unit Price (Rs)**	**Quantity**	**Amount (Rs)**	**Quantity**	**Amount (Rs)**
Bricks	Piece	6.5	15000	97500	12361	80347
Sand	Cum	700	20	14000	15	10500
Cement	Bag	350	110	38500	85	29750
Aggregate	Cum	1175	1	1175	1	1175
Steel	Kg	45	855	38475	653	29366
Whitewash	Kg	26	230	6000	115	2990
CGI sheet	Kg	58			110	6380
Bamboo	No.	300			50	15000
Sub-total Material				195650		175508
Skilled	Person-days	278	73	20294	75	20903
Unskilled	Person-days	217	102	22134	92	19964
Sub-total Labour[7]				42428		40867
Total				238078		216374
Beneficiary's contribution				90958		69254
Percentage				38.21		32.01
Notes:**i. The cost estimates include PMAY-G grant, MGNERGS wages, SBM, and Beneficiary contribution** **ii. These rate are inclusive of transportation cost**						

Source: PAHAL (2017b) and NIPFP estimations

There is a difference in the total cost of the PMAY-G house between PAHAL and our current estimation. The costfor design BR-06 is lower in our estimation than the cost given in PAHAL. This difference in the cost is mainly due to higher wages for labour in PAHAL (market rates for the skilledand unskilled labour)while in our estimation, the wage rates are taken as per the Minimum Wage Act 2016 of Government of Bihar, which is lower than that of PAHAL. Another factor responsible for lower cost is that our estimation considers a single rate for sand (depending upon the higher usage) which also accounts for some differences in the total cost of construction.

As already indicated in Figure 1 and the BR 05 for Bihar, Table 2.1 depicts that construction material is the major component in the overall expenditure in constructing a

[7]The skilled and unskilled labour implies masons and construction workers respectively.

house, which is approximately 82 percent, whereas the cost of labour is approximately 18 percent. Within the labour requirement, un-skilled person-days is 102, which is around 58 percent.

The second design (BR-06) also depicts similar inputs requirement with construction material comprising approximately 81 percent and cost of labour is approximately 19 percent. However, within the labour component, un-skilledperson-days is 92, which is around 55 percent.

The average cost per square meter across these designs also varies between Rs7175 toRs 6521. Therefore, the design with CGI sheets roof is considered for estimating the materials and labour required forplain areas as the total cost is marginally lower than the preceding one. The selection of BR-06 was also explained briefly in Figure 2.

2.2.2 Assumption for estimation

As we need to understand the direct and indirect impact of construction on both employment and incomes, there is a need to disaggregate the whole construction output in terms of inputs, especially into materials and labour. However, PAHAL does not provide the disaggregated data. Following assumptions were made for estimating the value of materials and labour.

1. The calculation of steel has been made considering the materials used in constructing the houses such as steel for reinforcement, chicken mesh, rod binding wire, shuttering materials, hardware (nails, lashes, and ropes), and the steel frame for the doors and windows. The rates for these materials are taken from PAHAL.

2. It is assumed that the total cost of white-wash is distributed between material and labour in 60:40 ratio. The labour cost thus obtained is added to the skilled labour cost. The rate for material-dry distemper is Rs 26 per kg.

3. The sand type is selected based on the higher percentage usage in constructing the house. The rate considered here is taken from PAHAL.

4. The wage rate for the labour is taken from the notification issued by Bihar’s

Minimum Wages Advisory Board, Labour Resources Department, Government of Bihar (2016)[8].Under this, skilled labourcost is Rs 278 per day while it isRs 217 per day for unskilled labour.

5. The rates of brick, cement, aggregate, steel, and sand are taken as per the market rates and the rates for CGI sheet and Bamboo are taken from PAHAL.

2.3 Components of Material and Labour for Selected Design (For Hills)

Design AS-03 is selected from the PAHAL-Volume II (PAHAL, 2017b) for estimating the materials and labour break-ups for all the hilly regions and IAP Districts which are receiving Rs 1.30 lakh. As per the information provided in the document, Zone C consists mainly of hilly regions of Assam which have a high vulnerability to landslides and medium to high vulnerability to cyclonic wind storms. This design is applied to all the areas which are receiving Rs 1.3 lakh i.e., the special category states and IAP districts. Another important variation between plain areas and hilly areas is that built-in area is higher in hilly areas as they have open space for plantation and other uses.

Design AS-03 of Table 2.2 also depicts that construction material is a major component in the overall expenditure of construction of a PMAY-G house (approximately 82 percent) whereas the cost of labour is approximately 18 percent. Within the labourcomponent, un-skilled person-days is105, which is around 69 percent.

The total cost in AS-03 is higher as per our estimation than that given in PAHAL. This difference could be due to increase in the price of aggregates (stone chips) from Rs 1400/cum in 2016 to Rs 2000/cum at present. For AS-03, the data on the amount of cement and sand for cement mortar to fix the bamboo posts or bamboo walls and for plastering the wall are not available. In order to get the estimated cost for this component, we have calculated the amount taking references from Analysis of Rates for Delhi, CPWD document, 2016. This also could have resulted in a higher cost for these materials. Further, the required number of bricks and its rate is not mentionedand here we have used the prevailing market rate of brick (Rs 7.5 per brick). Similarly, the prices of sand, cement, and aggregate are not given in the PAHAL's estimation. Therefore, we have used the current market prices of these items.

2.3.1. *Assumption for estimation*

1. Following conversion is used to convert the materials' quantity into standard units.
   1 cum = 35.31 cuft

[8] Government of Bihar (2016)indianstaffingfederation.org/wp-content/uploads/2016/09/MinimumWages-Bihar-wef-1st-Dec-2016.pdf as on 05-01-2018.

Kg = Density of materials × Quantity in cum

50 kg of cement = 1 bag

2. For converting the units from cum into kgs, we have used the density of the materials as given below:

Items	Density (Kg/cum)
Cement	1440
Sand	1600
Aggregate	2400

3. Since labour break-up is not given in PAHAL (2017a, 2017b), we have used the general trend that we have derived from other designs. On an average, labour cost is ranging around 18-20 percent of the total cost. Further, unskilled labour cost comprises approximately 60 percent of the total labour cost. We have used these two shares for our analysis in Table 2.2.

4. The wage rates notified by Labour Department, Government of Assam (2017) areused for skilledand unskilled labours which are Rs 350 and Rs 240 per day, respectively.[9]

Table 2.2:Estimation for design AS-03

Area of the House: **79.53 sq.m**				
Material	**Unit**	**Unit Price**	**Quantity**	**Amount (Rs)**
Bricks	No.	7.5	3200	24000
Cement	Bag	370	56	20720
Sand	Cum	1600	7	11200
Aggregate (stones)	Cum	2000	3	6000
Bamboo	Number	300	120	36000
Steel	Kg	65	350	22750
CGI sheet	Sq.ft.	42	1020	42840
Wood	Lump sum		28000	28000
Sub-Total Material				191510
Skilled	Person-days	350	48	16800
Un-skilled	Person-days	240	105	25200
Sub-Total Labour			153	42000

[9] (https://labour.assam.gov.in/sites/default/files/Minimum%20Wage%20Notification.pdf; accessed on 08-01-2017)

Total		233510
Beneficiary contribution		74125
Percentage		31.74

Notes: i. The cost estimates include PMAY-G grant, MGNERGS wages, SBM, and Beneficiary contribution
ii. These rate are inclusive of transportation cost

Source: PAHAL (2017b) and NIPFP estimations

2.4 Estimation of Direct Employment Generated and the Total Cost of the PMAY-G Houses

Based on the estimates per house derived in Section 2.2 for the plain areas and Section 2.3 for the hilly areas, an attempt has been made to estimate the direct employment and additional expenditure made for constructing the PMAY-G houses during April 2016 to 2018 (March 2018) in this section.

2.4.1 Direct employment through PMAY–G

The completed houses and houses under constructionunder PMAY-G till March 05, 2018is around 23.52 lakh and 21.28 lakh, respectively. The estimated overall direct employment due to PMAY-G house for completedhouses appears to be approximately40.07 crore person-days.Of this, nearly 16.04crore person-days are skilled labourand the remaining 24.03crore person-days are unskilled labour force. For houses under-construction, the total employment generated for both the years turns out to be 4.82 crore for skilled labour and 7.60 crore person days for unskilled labours till March 05, 2018. If all the beneficiaries have taken the support of MGNREGS and utilised 90 days or 95 days of unskilled labour under the scheme, then the estimated number of person-days would have been 21.46crore till5thMarch 2018 (Table 2.3). .

Table 2.3: Employment Generated under PMAY-G (Cumulative estimates up to March 05, 2018)

Cumulative Employment Generation (in crore)			
	Completed Houses	**Under Construction Houses**	**Total**
Employment Generated			
Skilled	16.04	4.82	20.85
Unskilled	24.03	7.60	31.62
of which MGNREGS	21.46	7.16	28.62

Total	**40.07**	**12.42**	**52.47**

Source: NIPFP estimations and AwaasSoft (accessed on 05.03.2018)

Considering the completed houses and houses under construction as on March 05, 2018, employment generated under PMAY-G is estimated for the years 2016-17 and 2017-18 (Table 2.4 and 2.5). While deriving the numbers of person days required for completion of house in plain areas and hilly areas, total employment generated in person-days is estimated separately for hilly and plain areas. In case of houses under-construction, if all the beneficiaries have taken the employment of 90 or 95 days under MGNREGS as unskilled labourthen the estimated number of person days appears to be 7.16 Crore.

Table 2.4: Estimation of Rural Housing Expenditure and Employment Generated for Completed Houses (cumulative numbers up to March 5, 2018)

Sl.		IAP District/ Special Category States	Non-IAP Districts/ General Category States	Total
1	No. of Completed Houses	602934	1748080	2351014
2	Total Grant of PMAY-G per house (excluding MGNREGS)	130000	120000	
3	Total Grant for all houses (in Crore)	7838.14	20976.96	28815.10
4	Total Grant Disbursed including Beneficiary Contribution (in Crore)	14079.09	37823.95	51903.04
5	Labour Cost (in Crore)[#]	2534.24	6808.31	9342.55
	a. Skilled[##]	1013.69	3256.42	4270.11
	b. Unskilled[##]	1520.54	3551.90	5072.44
6	Person-days (In Crore)			
	a. Skilled[###]	2.90	11.71	14.61
	b. Unskilled[###]	6.34	16.37	22.70
7	Estimated MGNREGS Person-days (in Crore)	5.73	15.73	21.46

Source: Estimates are based on AwaasSoft data as accessed on March 5, 2018

Note: 1. # 18% of Disbursed Cost. 2. ##Bifurcated in the ratio of 40:60 for IAP districts and Special Category States and 48: 52 for Non-IAP districts and General Category States for Skilled and Unskilledrespectively. 3. ###The wages for Skilled and Unskilled labour is taken as Rs.350 and Rs.240 respectively for IAP districts and Special Category Statesand Rs. 278 and Rs.217 respectively for Non- IAP districts and General category states.

Table 2.5: Estimation of Rural Housing Expenditure and Employment Generated for Houses Under-Construction (cumulative numbers up to March 5, 2018)

Sl.		IAP District/ Special Category States	Non-IAP Districts/ General Category States	Total
1	Under Construction Houses	652957	1474714	2127671
2	Total Grant of PMAY-G per house (excluding MGNREGS)	130000	120000	
3	Total Grant for all houses (in Crore)	8488.44	17696.57	26185.01
4	Total Grant Disbursed including beneficiary contribution (in Crore)	5337.95	12004.54	17342.50
5	Labour Cost (in Crore)#	960.83	2160.82	3121.65
	a. Skilled##	384.33	1033.52	1417.85
	b. Unskilled##	576.50	1127.30	1703.80
6	Person-days (In Crore)			
	a. Skilled###	1.10	3.72	4.82
	b. Unskilled###	2.40	5.19	7.60
7	Estimated MGNREGS Person-days (in Crore)	2.17	4.99	7.16

Source: Estimates are based on AwaasSoft data as accessed on March 5, 2018

Note: 1. # 18% of Disbursed Cost. 2. ##Bifurcated in the ratio of 40:60 for IAP districts and Special Category States and 48: 52 for Non-IAP districts and General Category States for Skilled and Unskilled respectively. 3. ###The wages for Skilled and Unskilled labour is taken as Rs.350 and Rs.240 respectively for IAP districts and Special Category Statesand Rs. 278 and Rs.217 respectively for Non- IAP districts and General category states.

2.4.2 Estimated total expenditure for completed houses

The total support given by the government for construction of one PMAY-G house is worked out to be Rs1.47 lakh in plain areas and Rs 1.59 lakh in hilly areas (Table 2.6). This includes MGNREGS wage contribution as well as the contribution for toilet under *Swachh Bharat Mission* in addition to Rs 1.2 lakh and Rs1.3 lakh as per PMAY-G guidelines for the plains and hilly areas respectively. The beneficiary seems to be contributing additionally, and this can be in the form of wages and other materials and this is estimated to be at Rs69-75 thousand per house by using desirable design (the cost of houses as per the PAHAL designs are higher than the government support). Going by these estimates, the total contribution from the beneficiaries could have been Rs16,575.4crore for all the houses constructed so far. This works out to be around 31-32 percentof the total cost of the house.

Table 2.6: Composition of rural housing expenditure

	Per house		All houses (in Lakh)	
	IAP districts/ Special Category States	**Non-IAP districts/ General category States**	**IAP districts/ Special Category States**	**Non-IAP districts/ General category States**
Total cost of the house (as per selected design from PAHAL)	233510	216374	1407911	3782391
PMAY-G grant	130000	120000	783814	2097696
MGNREGS man-days (wages)*	17385	15120	104820	264310
Swacch Bharat grant for Toilet	12000	12000	72352	209770
Beneficiary Contribution	74125	69254	446925	1210615

NOTE: *The wage rates taken are Rs. 183 for IAP districts and special category states and Rs. 168 for the Non-IAP districts and General category states. These rates are taken from MGNREGA's state wise wage rate for unskilled manual workers, Notification of Ministry of Rural Development (February, 2017) with 95 person-days for IAP districts and Special Category States and 90 person-days for Non-IAP districts and General Category States.

Source: NIPFP estimations and AwaasSoft (accessed on 05.03.2018)

Further, an attempt has been made to assess the increase in the demand for construction material due to the expenditure incurred on both completed houses and houses under-construction in PMAY-G (Annexure A1). The demand for bricks has gone up by 3063.14 crore (in numbers) during the last two years. Similarly, the demand for cement has increased by 23.61 crore bags, steel by 1.75 crore quintal, and sand by 3.95

crore cubic meter. Such increase in the input demand also has implications on the additional job creation (indirect employment) in the economy. The increased demand for the construction-related materials has generated 2.16 lakh additional jobs in the economy. About 57 thousand additional jobs have been generated each in bricks and cement industry. Similarly, about 58 thousand jobs have been created in the iron and steel industry due to increased demand for GCI sheets and steel (Annexure A2).

Section 3: Assessing the Macro Impact of PMAY-G Expenditures using Input Output Analysis

In this section, we try to understand the indirect effect of PMAY-G expenditures on both employment and output in India. The analysis is done using Input-Output Analysis propounded by (Leontief, 1936). The Input-Output analysis is widely used as an analytical tool to analyse the inter-linkages between the sectors of an economy through the use of Leontief Inverse Matrix, which is also known as 'multiplier matrix' (Leontief, 1936). The method allows the estimation of both direct and indirect impact of a particular sector on different parameters of economic performance. The structure of the I-0 analysis consists of the inter-sector flows of products from sector 'i' to sector 'j' as intermediate/primary input in order to produce one unit of output of sector 'j'. The I-O table essentially populates the numerous transaction in monetary terms amongst the sectors i.e., from sector 'i' to sector 'j'.The inter-sectoral transactions give a set of linear relationships that describe the input-requirements and output distribution of each sector of the economy.

The I-O analysis thus based on the core concept of technical coefficient (a_{ij}) that refers to the amount of input from sector 'i' required to produce one unit of output of the sector 'j'and is expressed given as below.

$$a_{ij} = \frac{X_{ij}}{X_j} ; i,j = 1,2,3,\cdots,n$$

Given that the I-O table is presented in monetary terms, a_{ij} gives the proportional value of the input purchased from all sectors per monetary unit of output. The basic equations for the basic data available from the input output table (IOT) are given as below.

$$X_j = \sum_{j=1}^{n} a_{ij} X_j + F_j$$

In matrix notation

$(I-A)X=F$

$$X = (I - A)^{-1}F$$

Here A (n*n) is the technical coefficient matrix, X is the vector of outputs and F is the vector of final demand. The column sum of the technical coefficient matrix reflects the input structure of the respective sector. The matrix $(I - A)^{-1}$ is known as Leontief Inverse matrix or the multiplier matrix which is the key component for deriving the specific multiplier.

The Multipliers

Output Multiplier:

The column sum of the Leontief Inverse matrix ($\sum_{i=1}^{n} r_{ij}$) is referred as the output multiplier. The income multiplier gives the increase in the gross output of all sectors given an increase in the final demand of the Jthsector by one unit. It captures both the direct and indirect input requirement from all sectors to produce 1rupee worth of output of the respective sector (e.g., jth sector). Similarly, the row sum($\sum_{i=1}^{n} r_{ij}$) gives the total impact on the output of the respective sector (e.g., ith sector) given an increase in the final demand of all sectors increases by one unit.

Income (GVA) Multiplier:

GVA multiplier of jth sector is given by$\sum_{i=1}^{n} v_i r_{ij}$, where v_i is the row vector of GVA coefficient for the different sectors. It gives the effect of an increase of one rupee worth of output in the final demand of jthsector on the output across the sectors (direct and indirect impact) which gets converted into one rupee new valued added generated. The value added coefficient of the jth gives the direct value addition by the jth sector due to an increase in the increase its final demand by one unit.

Employment Multiplier:

The employment multiplier of j^{th} sector gives the creation of additional employment in the economy due to an increase in its final demand by one unit. It is derivedas $n\sum_{i=1}^{n} l_i r_{ij}$, where $l_i$is the row vector of employment coefficients for different sectors. It measures the direct and indirect employment created in the economy when final demand for j^{th} sector increases by one unit. It should also be noted the additional job creation in the economy can also be interpreted in relation to direct employment in a particular sector. This can be expressed as the ratio of total additional employment in the economy to the employment coefficient. It gives the increase in total employment in the economy caused by one unit increase in the final demand of j^{th} sector which is enough to create single employment in the j^{th} sector. In other words, it gives the total additional employment in the economy for every single employment in j^{th} sector.

3.2 Impact of PMAY-G Expenditure on the Economy

For the analytical purpose, the present study uses the benchmark estimates from the 21 sector input-output table of India for 2009-10 given by Munjal et al. (2014) based on the CSO IO Table 2007-08. The more recent available 130 commodity × commodity IO table 2013-14based on the CSO supply and use tables and given by Singh and Saluja (2016) provides only multiplier for the construction sector as a whole, whereas, Munjal et al. (2014) provides estimates for the residential construction rather than the construction sector as a whole. Therefore, the latter has been used for estimating the benchmark multipliers to capture the impact of PMAY-G which indeed represent the PMAY-G housing sector. The I-O table 2009-10 segregates the construction sector into three separate sectors viz., residential construction, non-residential sector, and other construction, and gives estimates for the respective sector. Another advantage of using the I-O table 2009-10 is that it disaggregates some sectors to capture the inter-linkages of housing sectors. For example, manufacturing sector has been segregated into two: construction related manufacturing and other manufacturing. The construction related manufacturing includes wood and wood products, plastic products, paints, electrical cable and wire, cement, structural clay products, iron, steel, and Ferro alloys, hand tools and hardware, etc.

The benchmark estimates from the I-O table of India for 2009-10 are given in Table 3.1.[10] As residential construction is the closest proxy for PMAY-G hosing sector, the effect of government expenditure on PMAY-G on the employment and income can be examined by the changes in the final demand for residential construction. Thus, it is assumed that benchmark estimates of residential construction such as input

[10]Refer to Annexure A3 for the benchmark multipliers of the 21 sectors.

requirement, output distribution, and multipliers remains identical. The estimates for residential construction sector imply that an increase in the final demand by one unit in the residential sector is expected to:

i) Increase the output of the economy by 2.33 units as a result of the inter-sectoral linkages (output multiplier 2.33);

ii) Increase the GVA of the economy by 0.96 units as a result of the inter-sectoral linkages (GVA multiplier 0.96); and

iii) Increase the employment of the economy by 2.69 units as a result of the inter-sectoral linkages (employment multiplier 2.69).

Table 3.1: Benchmark estimates from the IO table of India for 2009-10

Industry	Output Multiplier	GVA Multiplier	Employment Multiplier
Construction related Manufacturing	2.59	0.95	0.56
Other Manufacturing	2.64	0.96	0.79
Residential Construction	**2.33**	**0.96**	**2.69**
Non-residential Construction	2.42	0.95	0.40
Other Construction	2.46	0.95	0.90
Transport by Other Means	2.37	0.96	0.81

Source: IO table 2009-10 for India (Munjal et al., 2014).

3.3 Impact of PMAY-G on Economy

The benchmark estimates are used to examine the impact of PMAY-G expenditure incurred during 2016-17 and 2017-18 through multiplier analysis. The government expenditure is a component of the final demand, and thus, its impact can be examined by changing the demand vector for the construction sector in the IO model by the expenditure incurred in a given year. Table 3.2 reveals the financial progress of the PMAY-G during 2016-17 and 2017-18 from our own estimates using the physical progress report of the MoRD and housing typology of PAHAL (as discussed in Section 2). Given that the benchmark estimates are based on the National Accounts Statistics (NAS) at 2004-05 base price, the PMAY-G expenditures are deflated (using Construction Sector Deflators) to derive comparable estimates for the macro-economic parameters. Based on the deflators, the cumulative estimated expenditures (based on selected PAHAL designs and sanctioned houses) at constant prices on PMAY-G works out to be Rs26476 crore (Rs. 19243 for 2016-17 and Rs. 7234 for 2017-18) for the completed houses. The same for the houses under construction is Rs. 8658 crore for the period under consideration at constant prices. Total cumulative expenditure under PMAY-G works out to be Rs. 35135 crore up to March 5, 2018.

Table 3.2: Government expenditure on PMAY-G

Year	Total Utilization (In RsCrore)	
	At Current Prices	At Constant Prices
Completed Housesin 2016-17	37443.80	19242.57
Completed Housesin 2017-18	14489.32	7233.80
Total Completed Houses	51933.12	26476.37
Total Under Construction*	17342.50	8658.25
Grand Total	**69275.62**	**35134.62**

Note: i * denotes only expenses undertaken by the beneficiaries who have taken 2nd and 3rd instalment.
ii. Prices are deflated to 2004-05 constant prices using construction sector deflators.

Table 3.3 present the changes in the macro-economic parameters with respect to the estimatedexpenditure based on PAHAL designs incurred during 2016-17and 2017-18 for completed houses and under construction houses for a cumulative period up to March 5, 2018. The total investment of Rs. 35134.62 crore gives an equivalent increase in the demand for residential construction and is expected to increase the production of residential construction by 22.67 percent. And the overall production of the economy increases by 0.65 percent due to the inter-sectoral linkages (Table 3.3).

Further, the cumulative expenditure in the PMAY-G could have generated 94.53 lakh additional jobs in the economy. Out of this, 83.35 lakh are directly employed in the residential construction sector (Table 3.3). This translates to an increase in the total employment by 1.77 percent. Similarly, the overall GVA is expected to increase by 0.55 percent (Table 3.3).

Table 3.3: Changes in the Gross Output, Gross Value Added and Employment due to PMAY-G expenditure

Industry	Initial Gross Output	2016-17	2017-18	Total Completed	Under construction	Grand Total
Addition to Gross Output(In Rs. Crore)						
Residential Construction	**157087**	**19504 (12.42)**	**7332 (4.67)**	**26837 (17.08)**	**8776 (5.59)**	**35613 (22.67)**
Construction related Mfg	1090366	8424 (0.77)	3167 (0.29)	11591 (1.06)	3790 (0.35)	15381 (1.41)
Total	**12697875**	**44877 (0.35)**	**16870 (0.13)**	**61748 (0.49)**	**20193 (0.16)**	**81940 (0.65)**
Addition to Gross Value Added (In Rs. Crore)						
Residential Construction	**61108**	**7587**	**2852**	**10440**	**3414**	**13854**
Construction related Mfg	246768	1907	717	2623	858	3481
Total	**6091485**	**18388 (0.30)**	**6913 (0.11)**	**25301 (0.42)**	**8274 (0.14)**	**33575 (0.55)**

Addition to Employment (In Lakh Jobs)						
Residential Construction	**367.64**	**45.65**	**17.16**	**62.81**	**20.54**	**83.35**
Construction related Mfg	141.41	1.09	0.41	1.50	0.49	1.99
Total	**5,355.40**	**51.77 (0.97)**	**19.46 (0.36)**	**71.24 (1.33)**	**23.30 (0.43)**	**94.53 (1.77)**

Source:Calculated using the benchmark estimates of IO table 2009-10 for India. The figures in parentheses represent percentage change as compared to benchmark estimates.

Annexure A3and Annexure A4present the changes in the macro-economic parameters with respect to the estimated expenditure incurred up to 5thMarch 2018. According to our estimate, the total amount spent for the completed PMAY-G houses stood at Rs 69275.62 crore in nominal terms and Rs. 35134.62 crore at constant prices. Given the benchmark estimates of IO Tables 2009-10 for India, this estimated expenditure on PMAY-G up to March 2018 (increase in final demand for residential construction in the IO Table) increases the production of residential construction by 22.67 percent and the overall production of the economy by 0.65 percent due to the inter-sectoral linkages (Table 3.3).

Further, the total PMAY-G estimated expenditure could have generated 94.53 lakh jobs in the economy showing an employment growth of 1.77 percent. Out of this, 83.35 Lakh are directly employed in the residential construction sector. In terms of GVA, it is expected to increase by 0.55 percent (Table 3.3).

Section 4: Estimations based on different Scenarios

The estimates made in the earlier sections is based on total volume of expenditure including assumed beneficiary contributions. However, the beneficiary contribution varies both in terms of quantum and beneficiaries affordability. All the beneficiaries may not be in a position to contribute additionally. Therefore, in this section an attempt is made to estimate the impact of PMAY on direct employment under three different scenarios of beneficiary contribution and also on total employment and income using IO tables.

Table 4.1: Three Scenarios for Comparing Output and Employment at Different Levels

Scenarios	Beneficiary's Contribution (in Rs.)
Case A	0

Case B	35,000
Case C	70,000

Based on our earlier estimates we found that beneficiary contributes to about 69,000 to 75,000 as per PAHAL design. As given in table-4.1 an assumption is made on different levels of contribution from the beneficiary in addition to government support. In Case A the beneficiary does not contribute any extra amount, in Case Bthe beneficiary contributes Rs. 35000 and in Case C, the beneficiary contributes Rs. 70000.

Table 4.2: Cost Break-up at Three Scenarios

Source	Hill/IAP	Non IAP & Plains
PMAY-G	130000	120000
MGNREGS	17385	15120
SBM	12000	12000
Total		
Case A	159385	147120
Case B	194385	182120
Case C	229385	217120
For MGNREGS Support for Unskilled Labour	Hill/IAP	Non/IAP & Plains
Days	95	90
Wages (Assam & Bihar)	183	168

Cost wise breakup under three scenarios is given table 4.2. The total cost in case A is Rs. 159385 for Hill areas and Rs. 147120. The wage rates assumed are Rs. 183 for hill areas and Rs.168 for plain areas.Total estimated expenditure under PMAY-G for constructed and under construction houses is given in table 4.2 for different scenarios. The total expenditure incurred for constructed houses for the cumulative period varies from Rs. 35328 crore for Case A,Rs. 43556 crore under Case B and Rs. 51785 crore under Case C. The total expenditure including under construction houses for the cumulative period varies from Rs. 47133 Crore in Case A to Rs.69074 Crore under Case C.

Table 4.3: Total Expenditure (Including Beneficiary's Contribution) on PMAY-G House in Three Different Scenario (in Rs Crore)

Year	Case	Non IAP/General	Hill	Total Exp.
Completed House				
	Case A	18249	7811	26060
2016-17	Case B	22591	9526	32117
	Case C	26932	11242	38174

	Case A	7468	1799	9267
2017-18	Case B	9245	2194	11439
	Case C	11022	2589	13611
	Case A	25718	9610	35328
Total	Case B	31836	11720	43556
	Case C	37954	13830	51785
Including the Under-construction Houses				
	Case A	33880	13253	47133
Grand Total	Case B	41940	16164	58104
	Case C	50000	19074	69074

4.2: Direct employment based on PAHAL design under three scenarios.

Adjusting the cost estimations based on PAHAL designs limiting to the government support and adding the beneficiary contribution under 3 scenarios direct employment generation is estimated in table 4.4. The total direct employment generated varies from 34.86 Crore Person-days under Case A without any contribution from the beneficiary to 43.00 crore person-days with additional contribution of Rs. 35000 from the beneficiary under Case B. The employment generation estimates to be about 51.13 crore person-days if the beneficiary contributes Rs. 70000 additionally under Cass C, which is almost similar to the one we have estimated in Section 2. (With a varying contribution of Rs.69 to 75 thousands among hilly and plain areas, the estimated employment generated is 52.47 crore person-days.

The employment generated by skilled and unskilled category under three scenarios is given in the table 4.5. Total Unskilled labour force varies from 20.36 core person-days under Case A to 25.10 crore person-days under case B and 29.84 crore under case C. Similarly the estimated numbers for skilled labour forceare 14.50 core, 17.90 crore and 21.30 crore, respectively, under these three cases.

Table 4.4: Total Employment Generated due to PMAY-G House Construction in Three Different Scenarios (in Crore Person-days)

Year	Case	Non IAP/General	Hill	Total
Completed House				
	Case A	14.1	5.12	19.22
2016-17	Case B	17.46	6.24	23.7
	Case C	20.81	7.37	28.18
	Case A	5.77	1.18	6.95
2017-18	Case B	7.14	1.44	8.58
	Case C	8.52	1.7	10.21

	Case A	19.87	6.3	26.17
Total	Case B	24.6	7.68	32.28
	Case C	29.33	9.06	38.39
Including the Under-construction Houses				
	Case A	26.18	8.68	34.86
Grand Total	Case B	32.41	10.59	43
	Case C	38.63	12.5	51.13

Table 4.5: Total Skilled and Un-SkilledEmployment Generated in Three Different Scenarios (in Crore Person-days)

Year	Case	Non IAP/General			Hill			Total		
		Skilled	Unskilled	Total	Skilled	Unskilled	Total	Skilled	Unskilled	Total
Completed House										
	Case A	6.34	7.76	14.1	1.61	3.51	5.12	7.95	11.27	19.22
2016-17	Case B	7.85	9.61	17.46	1.96	4.28	6.24	9.81	13.89	23.7
	CaseC	9.36	11.45	20.81	2.31	5.05	7.37	11.67	16.51	28.18
	Case A	2.6	3.18	5.77	0.37	0.81	1.18	2.97	3.98	6.95
2017-18	Case B	3.21	3.93	7.14	0.45	0.99	1.44	3.66	4.92	8.58
	Case C	3.83	4.69	8.52	0.53	1.16	1.7	4.36	5.85	10.21
	Case A	8.94	10.93	19.87	1.98	4.32	6.3	10.91	15.26	26.17
Total	Case B	11.06	13.54	24.6	2.41	5.27	7.68	13.47	18.81	32.28
	Case C	13.19	16.14	29.33	2.84	6.22	9.06	16.03	22.36	38.39
Including the Under-construction Houses										
	Case A	11.77	14.41	26.18	2.72	5.96	8.68	14.5	20.36	34.86
Grand Total	Case B	14.57	17.83	32.41	3.32	7.27	10.59	17.9	25.1	43
	Case C	17.38	21.26	38.63	3.92	8.58	12.5	21.3	29.84	51.13

4.3. Employment and output generation under PMAY-G using Input-output method.

To estimate the employment generation and additions to output considering the three possible scenarios using the IO tables the total expenditures given in table 4.2 needs to be converted into constant prices (Table 4.6). The total estimated expenditure in constant prices varies from Rs. 23532 Crore under Case A without any contribution from the beneficiary to Rs. 29008 Crore under case B and Rs. 34485 crore under case C.

Table 4.6: Total Expenditure (Including Beneficiary's Contribution) in Three Scenarios (in Rs Crore)

Year	Case A	Case B	Case C
Current Prices			
2016-17	26060	32117	38174
2017-18	9267	11439	13611
Total	35328	43556	51785

Grand Total (Including Under Constructed Houses)	47133	58104	69074
Constant Prices			
2016-17	13392	16505	19618
2017-18	4627	5711	6795
Total	17638	21745	25854
Grand Total (Including Under Constructed Houses)	23531	29008	34485

Note: Construction sector deflator is used in current to constant price conversion

Additions to Output:

Estimated additions to output from the residential construction and other related sectors are given in Table 4.7. Increase in output in residential construction due to PMAY-G housing is Rs. 23851 Crore (15.18%) in case A, Rs. 29403 Crore (18.72%) in case B and Rs. 34954 Crore (22.25%) under Case C. Similarly total additions to the output under these three cases are Rs. 54879 crore (0.43%), Rs. 67653 Crore (0.53%) and Rs. 80426 Crore (0.63%) respectively. One can see the table for yearly contribution in case of completed house only.

Additions to Employment

Given the expenditures, here we estimate the number of additional jobs created due to PMAY-G activityfrom the residential construction and other related sectors (see table 4.8). Increase in employment in residential construction due to PMAY-G housing is 55.82Lakh jobs (15.18%) in case A, 68.81 Lakh jobs (18.72%) in case B and 81.81 Lakh jobs (22.25%) under Case C. Similarly total additions to the employment under these three cases are 63.31 lakh jobs (1.18%), 78.05 lakh jobs (1.46) and 92.78 lakh jobs (1.73%) respectively. The table also contains number of jobs that would have been created only by the completed houses.

Table 4.8: Total Employment Generated due to PMAY-G House Construction in Three Different Scenarios (in Crore Person-days)

Years	Industry	Case A	% Change	Case B	% Change	Case C	% Change
2016-17	Construction related Mfg	0.76	0.54	0.94	0.66	1.11	0.79
	Residential Construction	31.77	8.64	39.15	10.65	46.54	12.66
	Transport by Other Means	0.19	0.10	0.24	0.13	0.28	0.15
	Total	36.03	0.67	44.41	0.83	52.78	0.99
2017-18	Construction related Mfg	0.26	0.19	0.32	0.23	0.39	0.27
	Residential Construction	10.98	2.99	13.55	3.68	16.12	4.38
	Transport by Other Means	0.07	0.04	0.08	0.04	0.10	0.05
	Total	12.45	0.23	15.37	0.29	18.28	0.34
Total	Construction related Mfg	1.00	0.71	1.23	0.87	1.47	1.04
	Residential Construction	41.84	11.38	51.58	14.03	61.33	16.68

	Transport by Other Means	0.25	0.14	0.31	0.17	0.37	0.20
	Total	47.45	0.89	58.51	1.09	69.56	1.30
Grand Total (Including Under Constructed Houses)	Construction related Mfg	1.34	0.94	1.65	1.16	1.96	1.38
	Residential Construction	55.82	15.18	68.81	18.72	81.81	22.25
	Transport by Other Means	0.34	0.18	0.42	0.23	0.49	0.27
	Total	63.31	1.18	78.05	1.46	92.78	1.73

Notes: The employment generated in the residential construction is the direct employment and the remaining is the indirect employment. The total employment includes 21 sectors as listed in Table 3.2. Percentage Changes are is calculated as compared to the benchmark data of IO table 2009-10.

While utmost care has been taken during the analysis, however, the report has its own limitations. First, the cost-estimation for the current analysis is undertaken based on the PAHAL designs, which are suggestive in nature. Second, beneficiaries' contribution is calculated based on the available designs, and the three cases are framed on the basis of provision of institutional finance of Rs 70,000. However, the actual contribution could vary. Third,the analysis of the impact of PMAY-G housing on demand for construction materials viz., cement, steel brick, tiles, sanitary wares etc., has not been carried out due to limited segregation of IO table 2009-10. The IO Table 2009-10 does not provide the flexibility to estimate the employment potential due to increased activities in Cement, Steel sectors, etc. separately. Although CSO IO Tablesfor 2007-08 provides these sectors separately, it does not provide any information on employment compelling us to use IO Table 2009-10 given by Munjal et al. (2014).

Section 5:Summary and Conclusions

Rural housing has been one of the most priority areas for the current government. Towards this end, the government has brought in Pradhan MantriAwaasYojana–Gramin, which is a revamped version of earlier scheme in terms of design, fund flow mechanism, quality, and other implementation activities and this is implemented since 2016-17. In this report, an attempt has been made to understand the macroeconomic impact of constructed as well as under construction houses on two major macro parameters namely employment and output. As the construction in general and rural housing, in particular, is expected to have strong forward linkage with other sectors in the economy, the impact on employment and output can be through direct as well as indirect channels. This report looks at both direct and indirect impacts on employment and output for the cumulative period from April 2016 to March 5, 2018.

The direct employment has been calculated in terms of person-days generated based on the sample designs for rural housing, which contain some information about the labour

and material components. In the case of indirect employment, the report uses the Input-Output table as it provides the multipliers for employment, value addition as well as output.

By using information about the completed and under construction houses since 2016-17 that is made available through AwaasSoft and by the MoRD, we estimate that the scheme could have generated about 52.47 crore person-days. Of this, nearly 20.85 crore person-days are for skilled labour and the remaining 31.62 crore person-days are for the unskilled labour forcein both years. The direct employment generated through completed houses stands at 40.07 crore person-days (24.03 crore person-days unskilled and 16.04 Crore person-days skilled labour force) and that of under construction houses is 12.42 crore person-days (7.60 Crore person-days unskilledand 4.82 Crore person-days skilled labour force).If all the beneficiaries have taken the support of MGNREGS and utilised 90 days or 95 days of unskilled labour depending on the region, then the estimated number of person-days generated under MGNREGS scheme could be 21.46 crore person-days for completed houses and 7.16 crore person-days for under construction houses that adds up to a total of 28.62 Crore person-days..

The total financial support provided to the beneficiaries per house by the government is Rs 1.47 lakh and Rs 1.59 lakh in plain areas and hilly areas respectively. This includes MGNREGS wage contribution and contribution for the toilet in Swachh Bharat Abhiyan in addition to the specified financial support of Rs 1.2 (plain areas) and 1.3 lakh (hilly areas) per house. In addition to this, it is estimated from the PAHAL design, the beneficiaries could be contributing in the form of wages and/or other material about Rs 69000-75000 per house depending on the design and area. This turns out to be about 31to 32 percent of the total cost of the houses constructed so far. Our estimates take the beneficiary contributions also into consideration and, hence, this could be one reason for marginal overestimation of person-days generated compared to AwaasSoft.

By using the Input-Output tables, assuming that beneficiary contributes about 32% over and above the Government's contribution, we find that the scheme could have generated 94.53 lakh jobs (both direct and indirect) in the economy since its inception up to March 5, 2018. Out of this, 83.35 lakhs are directly employed in the residential construction sector. Considering together the amount spent in the last two years (2016-17 and 2017-18), the estimated changes in the macro-economic parameters suggest that expenditure in PMAY-G is expected push up the gross output, employment, and GVA by 0.65 percent, 1.77 percent and 0.55 percent respectively.

Considering the fact that the beneficiary contribution varies both in terms of quantum and beneficiaries' affordability, attempt is made to estimate the impact of PMAY-G on direct employment and output under three different scenarios of beneficiary contribution. The first

scenario assumes no additional contribution from the beneficiary, second scenario assumesbeneficiary contributesRs 35000, and finally third scenario assumes that beneficiary contributes Rs. 70,000.

The direct employment generated in case of unskilled category under three scenarios varies from 20.36 core person-days under first to 25.10 crore person-days under second and 29.84 crore under third scenario. Similarly the estimated numbers for skilled labour force are 14.50 core, 17.90 crore and 21.30 crore, respectively. In the case of output, our estimates suggest that output could increase by 0.43, 0.53 and 0.63 percent, respectively, in three different scenarios. In terms both direct and indirect employment, the total additions to the employment under cases are estimated to be 63.31 lakh jobs (1.18%),78.05 lakh jobs (1.46) and 92.78 lakh jobs (1.73%), respectively.

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Annexures

Annexure A1: Increased demand for the Construction Material due to PMAY-G Program (Cumulative)

Materials	Unit	Completed	Under Construction	Grand Total	*Increased Demand (in INR Crore)*
PMAY-G Expenditure	INR Crore	51903.02	17342.50	69245.51	***69245.51***
Material Cost	INR Crore	42226.86	11070.85	53297.72	***53297.72***
Bricks	Crore No.	2353.74	709.40	3063.14	***20149.87***
Cement	Crore Bag	18.24	5.37	23.61	***8346.44***
Sand	Lakh Cum	304.42	90.62	395.03	***3236.68***
Aggregate (Stones)	Lakh Cum	35.57	9.72	45.29	***717.40***
Steel	Lakh Quintal	135.18	40.08	175.26	***8410.65***
GCI sheet	Crore Sq.ft./Kg	61.50/19.23	0.00/0.00	61.50/19.23	***3698.24***
Bamboo	Crore No.	15.98	4.43	20.40	***6120.46***
Wood	INR Crore	1688.22	407.07	2095.29	***2095.29***
Whitewash	Lakh Quintal	20.10	0.00	20.10	***522.67***

Note: The unit of measurement for GCI sheet is sq.ft. for the hills and Kgs for the plains.

Annexure A2: Indirect Employment Generation in the Construction Related Material Sectors due to PMAY-G Program during 2016-17 and 2017-18

Materials	I-O Classification	Completed	Under Construction	Total
Bamboo	Forestry	9637	3220	12857
Wood	Wood and wood product	10877	3634	14512
Brick	Structural clay products	43142	14415	57557
Cement	Cement	42770	14291	57061
GCI	Iron, steel andFerro alloys	37897	0	37897
Steel	Iron and steel foundries	15057	5031	20088
Others		3011	12519	15530
Total		162392	53110	215502

Note: The estimation is based on benchmark estimates from the I-O Table 2013-14 which is compiled from Supply and Use table of CSO (Singh and Saluja, 2016). These estimates are mostly indicative of the amount of indirect employment generation as there is no exact classification for the construction related materials other than cement. The rest are mapped with the existing classifications and accordingly the employment multipliers of the mapped classification are used to estimate the indirect employment.

Annexure A3: Benchmark estimates from the IO table of India for 2009-10

Sl	Industry	Output Multiplier	GVA Multiplier	Employment Multiplier
1	Agriculture including Livestock	1.60	1.00	2.55
2	Forestry and Logging	1.33	0.99	0.22
3	Fishing	1.30	0.99	0.38
4	Mining and Quarrying	1.53	0.99	0.31
5	Construction related Manufacturing	2.59	0.95	0.56
6	Other Manufacturing	2.64	0.96	0.79
7	**Residential Construction**	**2.33**	**0.96**	**2.69**
8	Non-residential Construction	2.42	0.95	0.40
9	Other Construction	2.46	0.95	0.90
10	Electricity, Water Supply	2.23	0.98	0.35
11	Trade	1.40	0.99	0.50
12	Hotel and Restaurants	2.25	1.02	1.49
13	Railways	1.90	0.98	0.36
14	Transport by Other Means	2.37	0.96	0.81
15	Storage	1.92	0.99	0.52
16	Communication	1.57	0.98	0.32
17	Real Estate Services	1.42	0.98	0.40
18	Ownership of Dwelling & Business Services	1.37	0.99	0.18
19	Banking and Insurance	1.32	0.99	0.21
20	Public Administration and Defence	1.00	1.00	0.24
21	Other Services	1.47	0.99	0.64

Source: IO table 2009-10 for India (Munjal et al., 2014).

AnnexureA4: Changes in the Gross Output due to PMAY-G expenditure (In Rs Crore)

			Addition to Gross Output				
Sl	**Industry**	**Initial Gross Output**	**2016-17**	**2017-18**	**Total Completed**	**Under construction**	**Grand Total**
1	Agriculture includingLivestock	1374654	1026 (0.07	386 (0.03)	1411 (0.10)	461 (0.03)	1873 (0.14)
2	Forestry and Logging	121352	869 (0.72)	327 (0.27)	1196 (0.99)	391 (0.32)	1587 (1.31)
3	Fishing	61097	3 (0.01)	1 (0.00)	5 (0.01)	2 (0.00)	6 (0.01)
4	Mining and Quarrying	209505	2240 (1.07)	842 (0.40)	3082 (1.47)	1008 (0.48)	4090 (1.95)
5	Construction related Manufacturing	1090366	8424 (0.77)	3167 (0.29)	11591 (1.06)	3790 (0.35)	15381 (1.41)
6	Other Manufacturing	3371478	3969 (0.12)	1492 (0.04)	5461 (0.16)	1786 (0.05)	7247 (0.21)
7	**Residential Construction**	**157087**	**19504 (12.42)**	**7332 (4.67)**	**26837 (17.08)**	**8776 (5.59)**	**35613 (22.67)**
8	Non-residential Construction	851460	1419 (0.17)	533 (0.06)	1953 (0.23)	639 (0.07)	2591 (0.30)
9	Other Construction	436822	728 (0.17)	274 (0.06)	1002 (0.23)	328 (0.07)	1329 (0.30)
10	Electricity, Water Supply	265207	949 (0.36)	357 (0.13)	1306 (0.49)	427 (0.16)	1733 (0.65)
11	Trade	1173303	2479 (0.21)	932 (0.08)	3411 (0.29)	1115 (0.10)	4526 (0.39)
12	Hotel and Restaurants	266847	227 (0.09)	85 (0.03)	313 (0.12)	102 (0.04)	415 (0.16)
13	Railways	96243	159 (0.16)	60 (0.06)	218 (0.23)	71 (0.07)	290 (0.30)
14	Transport by Other Means	875157	1307 (0.15)	491 (0.06)	1798 (0.21)	588 (0.07)	2386 (0.27)
15	Storage	6396	13 (0.20)	5 (0.08)	18 (0.28)	6 (0.09)	24 (0.37)
16	Communication	120308	55 (0.05)	21 (0.02)	76 (0.06)	25 (0.02)	100 (0.08)
17	Real Estate Services	30445	29 (0.10)	11 (0.04)	40 (0.13)	13 (0.04)	53 (0.18)
18	Ownership of Dwelling & Business Services	762718	359 (0.05)	135 (0.02)	494 (0.06)	162 (0.02)	655 (0.09)
19	Banking and Insurance	394617	939 (0.24)	353 (0.09)	1292 (0.33)	423 (0.11)	1715 (0.43)
20	Public Administration and Defence	405631	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
21	Other Services	627181	178 (0.03)	67 (0.01)	245 (0.04)	80 (0.01)	326 (0.05)
	Total	**12697875**	**44877 (0.35)**	**16870 (0.13)**	**61748 (0.49)**	**20193 (0.16)**	**81940 (0.65)**

Source:Calculated using the benchmark estimates of IO table 2009-10 for India. The figures in parentheses represent percentage change as compared to benchmark estimates

Annexure A5: Additional Job Creation in the Economy due to PMAY-G expenditure (In Lakh Jobs)

			Addition to Employment				
Sl	**Industry**	**Initial Employment**	**2016-17**	**2017-18**	**Total Completed**	**Under Construction**	**Grand Total**
1	Agriculture includingLivestock	2,901.00	2.16	0.81	2.98	0.97	3.95
2	Forestry and Logging	12.26	0.09	0.03	0.12	0.04	0.16
3	Fishing	17.44	0.00	0.00	0.00	0.00	0.00
4	Mining and Quarrying	31.81	0.34	0.13	0.47	0.15	0.62
5	Construction related Manufacturing	141.41	1.09	0.41	1.50	0.49	1.99
6	Other Manufacturing	428.77	0.50	0.19	0.69	0.23	0.92
7	**Residential Construction**	**367.64**	**45.65**	**17.16**	**62.81**	**20.54**	**83.35**
8	Non-residential Construction	22.25	0.04	0.01	0.05	0.02	0.07
9	Other Construction	227.05	0.38	0.14	0.52	0.17	0.69
10	Electricity, Water Supply	12.71	0.05	0.02	0.06	0.02	0.08
11	Trade	428.10	0.90	0.34	1.24	0.41	1.65
12	Hotel and Restaurants	64.06	0.05	0.02	0.08	0.02	0.10
13	Railways	10.73	0.02	0.01	0.02	0.01	0.03
14	Transport by Other Means	184.74	0.28	0.10	0.38	0.12	0.50
15	Storage	1.83	0.00	0.00	0.01	0.00	0.01
16	Communication	18.50	0.01	0.00	0.01	0.00	0.02
17	Real Estate Services	7.59	0.01	0.00	0.01	0.00	0.01
18	Ownership of Dwelling & Business Services	52.52	0.02	0.01	0.03	0.01	0.05
19	Banking and Insurance	39.92	0.10	0.04	0.13	0.04	0.17
20	Public Administration and Defence	95.89	-	-	-	-	-
21	Other Services	289.18	0.08	0.03	0.11	0.04	0.15
	Total	**5,355.40**	**51.77**	**19.46**	**71.24**	**23.30**	**94.53**
			0.97	0.36	1.33	0.43	1.77

Source:Calculated using the benchmark estimates of IO table 2009-10 for India. The figures in parentheses represent percentage

AnnexureA6: Addition to the Gross Value Added in the Economy due to PMAY-G expenditure (In Lakh Jobs)

			Addition to Gross Value Addition				
Sl	**Industry**	**Initial Gross Output**	**2016-17**	**2017-18**	**Total Completed**	**Under Construction**	**Grand Total**
1	Agriculture includingLivestock	944960	705	265	970	317	1287
2	Forestry and Logging	102421	734	276	1010	330	1340
3	Fishing	52363	3	1	4	1	5
4	Mining and Quarrying	157463	1683	633	2316	757	3074
5	Construction related Manufacturing	246768	1907	717	2623	858	3481
6	Other Manufacturing	632970	745	280	1025	335	1361
7	**Residential Construction**	**61108**	**7587**	**2852**	**10440**	**3414**	**13854**
8	Non-residential Construction	297940	497	187	683	223	907
9	Other Construction	143500	239	90	329	108	437
10	Electricity, Water Supply	104894	375	141	516	169	685
11	Trade	934603	1975	742	2717	888	3605
12	Hotel and Restaurants	87928	75	28	103	34	137
13	Railways	58216	96	36	132	43	175
14	Transport by Other Means	325089	485	182	668	218	886
15	Storage	3786	8	3	11	3	14
16	Communication	89837	41	15	56	18	75
17	Real Estate Services	22124	21	8	29	10	39
18	Ownership of Dwelling & Business Services	608515	286	108	394	129	523
19	Banking and Insurance	331660	789	297	1086	355	1441
20	Public Administration and Defence	405631	0	0	0	0	0
21	Other Services	479710	136	51	188	61	249
	Total	**6091485**	**18388**	**6913**	**25301**	**8274**	**33575**
			0.30	0.11	0.42	0.14	0.55

Source:Calculated using the benchmark estimates of IO table 2009-10 for India. The figures in parentheses represent percentage change as compared to benchmark estimates.