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Households' invisible input to the economy: a review of its measurement methods and results

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Abstract

Unpaid domestic work is the main part of non-market household production which is not covered by national statistics (GDP). The monetary value of unpaid work is identified within the gross value added (GVA), which is 60–80% of (the invisible) non-market household production. GVA of unpaid work provides significant information about the household sector and its impact on the national economy even if some part of that production is unobserved. After long discussions, a consensus was achieved and the input method was approved and used in the estimates of unpaid work in the Household Satellite Accounts (HHSA). However, the consensus is still in the process of household estimations. This paper shows that different wages used in input methods do not change the final proportion of the GVA of unpaid work to total household production. The analysis also confirms that, in accordance with UNECE and Eurostat, a regular implementation of the HHSA alongside the core system – the European System of Accounts – is a valuable and comprehensive tool for assessing the total output of household production (both market and non-market).

Key words: household production, input method, unpaid work, satellite accounts, time use survey.
JEL: D13, J10, J13, J16.

1. Introduction

The household is a dynamic economic unit where the division of responsibilities plays a key role in everyday functioning. Everyone is involved in the household structure, even if it is an individual or collective household. In the System of National Accounts (SNA) and European System of Accounts (ESA) households are treated as an institutional sector, which is one of 5 sectors in the economy. Therefore, the household is a special sector which covers the whole territory of the country. Any other sector does not include each unit of the category. In the household, regardless of whether it is family

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or non-family, one- or multi-person, individual or collective, people share their duties to provide all basic functions to realize individual or group (social) needs.

For ages, people have allocated their time to activities that can be classified as paid work, unpaid work, and no work (personal care, leisure time). "No work time" is more various than paid and unpaid work because it can be divided into different groups of activities, e.g. personal care, leisure time, work as a volunteer (without money), help for others (neighbors, family members in other households).

Historical research of time distribution was carried out in England and France at the end of 19th century, based on analysis of 'duty time'. The duty time covered only the time spent on paid work (Poissonnier and Roy 2013; Soinne 2021; Szép 2003; Varjonen and Aalto 2010, 2006; Varjonen and Hamunen 2014; 1999; Błaszczak-Przybycińska and Marszałek 2021, 2020, 2015). The analyses were provided to register the time spent in factory by employees because the workers demanded shortening working hours and increasing the salaries (Błaszczak-Przybycińska 2020, 2008).

Housework was separated in a different group of activities in the late 1950s. The first time use surveys were conducted to the analyses of time distribution in households. In Polish, research of time budgets showed the analogy between increasing of efficiency in paid work as well as in housework. Since the 1960s, a prior assumption of the substantial amount of research has been considered to undertake the differences in the socio-economic status between men and women. At this time in United Nations, many governments debated to eliminate all forms of discrimination against sex, nationality.

For decades, scientific findings have pointed out that gender disparities in paid and unpaid work, is a contributing factor to promoting not only gender inequality, but also economic growth and development. Time use surveys and current scientific research provide valuable guidance regarding the balance and satisfaction associated with this allocation.

In this article, we will focus on the analysis of methods and different approaches to estimating the value of unpaid work in order to present the non-market household production, the most invisible part of productive results which are made for own use at home. Household production (both market and non-market) is an important component of total economic output to growth and development in national and international perspective. This study is drawing on research conducted priory in European countries, with the international context of the household economy. Our results are consistent with previous works about regular compilation of satellite accounts which are the most appropriate statistical tool to better understand the overview of social and economic condition of households.

The article is organized as follows. We begin with the theoretical framework of Becker's model of time allocation as a foundation to further statistical models and estimations of unpaid work and non-market production which is invisible in official

statistics. Conventional economic statistics, such as national accounts, are supplemented with time use survey data, which provides an economic perspective of unpaid domestic work estimation. The monetary value of unpaid work is identified with the gross value added (GVA), which is the significant part of the household production, and covers 60-80% of that production. In the paper, methodological differences between various approaches of calculation were also described based on current analyses provided in European countries. The final results of estimates confirmed that the input method delivers the most accurate data to the international comparisons and the core national accounts.

2. Time allocation model and time distribution research

2.1. Time use survey

The theoretical background of time use research had its beginning in 18th century (Luszniewicz 1982). Before that time any household duties were not observed or noted as productive activities realized at home for all household's members.

The breakthrough for research of time distribution was Becker's theories of the time allocation model and dual role of household: production and consumption. The theoretical and practical foundations for Becker's classic theory of time allocation took place in other analytical studies. Mitchell (1912) claimed that if households are compared to a company which produces goods or services for the market selling, the households are insufficient in producing domestic services. Reid (1934) recognized in the early 1930s that both paid and unpaid work should be treated as total household production which generates comprehensive overview of household productive activities. She also underlined that national economy does not cover the important components of production, unpaid work and service work as a main part of household production. Kuznets (1934) also confirmed that system of national account (SNA), which recommend the structure and calculations of national income, GDP and macroeconomic indicators, omitted significant part of household production.

While statistical studies on Becker's model (Becker 1965) were performed and developed (Kuznets 1934; Gorman 1959; Gronau 1977, 1986, and 1997; Graham and Green 1984; Koreman and Kapteyn 1987; Heckman 1988 and 2015; Fitzgerald 1996), economists discussed on GDP limitations in describing the socio-economic development (Stiglitz et al. 2009; Folbre 2006; Gershuny 2005 and 2000). The national official statistics do not contain important effects of economic production which was made outside the market, in households. Economists agreed that household products (goods and services) made by themselves have the important economic value and enormous quantity even if they are not registered in macroeconomic indicators such as GDP, national income, value added.

Also, United Nations Economic Commission for Europe (UNECE) identified unpaid work as one of the most informative area, with other sources not providing sufficient data (UNECE 2017). A lack of information on domestic household service work might lead to inadequate policy conclusions. An increase of childcare or long-term care services available in the private or public (governmental) sector, generates also the increase in gross value added of goods and services in this area. It reflects a growth of production, but it also illustrates the shifts from household sector to the market. UNECE provided the guideline for valuing own-use household work of services, and methods to compile the Household Satellite Accounts and HETUS recommendations for European countries.

European Union countries carry out the time use survey regularly in harmonized waves. HETUS 2000 (Harmonised Time Use Survey) was the first round, which was conducted between 1998 and 2006 in 15–EU countries. HETUS 2010 gathered data between 2008 and 2015 in 18–EU countries. HETUS 2020 is ongoing round in which 20 countries plan to conduct the survey. The final collection of microdata is planned before 2027. Harmonization of methodological guidelines standardize the survey design, structure, content, statistical classifications, timing, frequency, but some local differences remain.

The monetary value of unpaid work, as a main component of household production, is measurable and countable if we use it in unconventional economic statistics, e.g. sample surveys, such as time use survey (TUS). Time use survey provides the information about time distribution in households. It also collects various data about socio-economic status of households, their demographical structure, and overview of daily schedule of activities. Respondents register each single activity in 10-minute periods during 24 hours by 2 days (a day: from Monday-Friday, and one weekday: Saturday or Sunday). Those activities were gathered into 10 different groups, such as: personal care (sleeping, eating, washing, dressing), paid work, household and family care (unpaid work), study, voluntary work, social life and entertainment, sports, hobbies, mass media, travel.

2.2. Value of domestic labor

When we begin to compare unpaid work estimates, we start from the point whether unpaid work is economic work or non-economic work. Pigou noted that "if a man marries his housekeeper or his cook, the national dividend is diminished" (Pigou 1920). If someone hires the housekeeper, employer will pay the salary for her or him, so this transaction will be able visible and reflected in GDP. In other case, if the same person realizes the same productive activities without remuneration, it will not be reflected in economic measures and indicators.

Currently, towards to SNA 2025, the update program of SNA 2008 for national statistics, efforts are underway to develop new guidelines tailored to the market and economic context, with the aim of permanently integrating the valuation of unpaid work and household production into national accounts[2].

According to European System of Accounts 2010 (legal act for EU members), which is based on System of National Accounts (SNA 2008), it provides the conceptual framework that sets the international statistical standard for the measurement and classification of economic activities, and economic aggregates such as Gross Domestic Product or Gross National Income. ESA 2010 also indicates the household work activities, which are deemed "market" or "economic work", e.g. paid work. Market work is included in "SNA production boundary". Other unpaid work activities are classified as "non-market" or "non-economic" so they are "invisible" and missed in official measures and indicators in the economy (Table 1.).

Table 1: The overlap of paid and unpaid work in SNA/non-SNA work

SNA work (production boundary) Visible, recorded in GDP	1. Paid work (for the market	2. Unpaid work (for the market): (a) owner occupiers' imputed rents (housing services of equivalent rented accommodation); (b) own-account house constructions; (c) paid domestic staff; (d) agricultural production for own use (hunting, fishing, picking berries and mushrooms); (e) collection of raw materials for income generating activities like handicrafts, and other manufacturing	3. Unpaid work for the household (non-market)
Non-SNA work (outside the production boundary) Invisible in GDP			D. Unpaid work (non-market, household maintenance, care work, and volunteer work)

*Source***:** *own work based on Eurostat 2013.*

[2] Towards the 2025 SNA, https://unstats.un.org/unsd/nationalaccount/towards2025.asp (accessed: 03/02/2025).

ESA 2010, as well as previous version ESA 1995, indicates that some unpaid domestic activities are treated as economic because they are measured and included in annual estimates of GDP. These comprised of: (a) owner occupiers' imputed rents (housing services of equivalent rented accommodation); (b) own-account house constructions; (c) paid domestic staff, (d) agricultural production for own use (hunting, fishing, picking berries and mushrooms), and (e) collection of raw materials for income generating activities like handicrafts, and other manufacturing. Accordingly, unpaid economic work consists of activities producing for own use, as well as for the market. In practice, data collection, identification and classification of each type of household unpaid productive activity in Gross National Income (GNI) and GDP is very difficult (Table 1.).

Other types of unpaid domestic work are deemed by the SNA 2008 (and previous SNA 1993) to be "non-economic", treated also as "invisible" in GDP, and are relegated "outside the SNA production boundary". Non-SNA household work consists of 5 groups of productive activities: (1) housing services (cleaning, repairing, and other maintenance), (2) food preparation (cooking, dish-washing, cleaning, shopping), (3) providing and repairing clothes, (4) care work for infants, children (active and passive care), care for dependent people (ill or temporarily sick, elder and disabled), and (5) all volunteer work for family members living in separate household and other community services.

The Eurostat (ESA and SNA) and the UNECE proposals recommend to compile the parallel (satellite) accounts as a supporting and comprehensive to the national accounts. Household Production Satellite Account (Household Satellite Account, HPSA, HHSA) is an additional account which provide the information of SNA/non-SNA household production. Table 1. presents a composition of relationship between paid and unpaid work and SNA/non-SNA production boundaries. To briefly sum up, work is unpaid in 2. and 3. cell. The 2. unpaid work is registered in GDP, because it is produced to the market, but 3. unpaid work is produced and consumed by households themselves, so it is produced for their own use, not to the market.

The estimation of unpaid household work can be done using two approaches: *the input method* and *the output method*. Both methods, *input* and *output* provide the sufficient information about housework. *The input method* is more often applied to estimating the value of unpaid work (Varjonen et al. 2014). Two different approaches are used: (1.) *the replacement cost* and (2.) *the opportunity (alternative) cost* (Figure 1.).

The replacement cost approach provides three options: (1a) is to use the wages of specialized workers in market enterprises. It can be reasoned that specialized workers in certain occupations perform similar activities to those done in households, e.g. a cook in a restaurant, a teacher at school, a task manager at an enterprise, etc. The difficulties start when we consider the productivity and working conditions in market

enterprises, which are different from those prevailing in the household, e.g. capital investment is higher, production is organized according to specialization of skills, task (mass production). It is also difficult to choose the adequate level of qualification of the jobs in the market (variety is large, e.g. from the chef de cuisine to the kitchen maid or trainee). In housework several tasks are performed simultaneously: the main activity (e.g. childcare) and second or third activities (cooking, cleaning), whereas in enterprises work may be more like line production (Goldschmidt-Clermont 1994).

The second option (1b) is to apply the wages of specialized workers at home. One can purchase the services of a specialized worker who comes to work in a household as a cleaner, window cleaner, plumber, gardener, private teacher, nurse, dog walker, etc. Workers who come to the home may use tools and materials of their own or those available in the household. The working conditions come closer to those in housework, except that these specialized workers focus on one task at a time. The payments by households to these specialized workers, however, are higher than the wages for workers in enterprises because the former include also other costs than just wages. This aspect must be taken into account in measuring household work and production (Eurostat 2003).

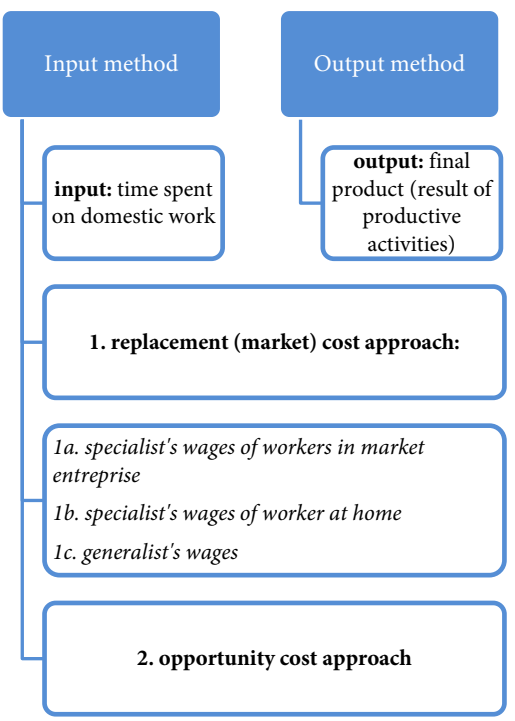

Figure 1: Domestic work estimation methods

Source: own compilation.

The third possibility (1c) is to apply the wages of generalist workers. Household requires may be provided by professional paid staff. These are workers who may or may not have received a special qualification for their job and who are most often responsible for supporting and visiting elderly people or helping when a parent caring for home and children are ill. However, the paid domestic staff usually provide some household tasks, except household management, volunteer or community work (Goldschmidt-Clermont 2000 and 1994).

The opportunity cost method (2.) is complicated to apply because the problem concerns the different values of similar products depending on who did the housework. Many researchers argue that this approach should not be used to value household production (e.g. Goldschmidt-Clermont 1994, 2000; Blades 1997). This method may be relevant for the recognition of utility maximation at the micro-level concepts of the core (national) accounts.

The precedent assumption in the replacement (market) cost method is that housework done by household members could be realized by a hired person, referring to the "third party criterion" or "productivity criterion", which provides the distinguishing between productive and unproductive household activities (Eurostat, 1999). Therefore, each type of domestic work can be valuated using the market cost of parallel services. The replacement cost method can be based on generalist's or specialist's wages (Varjonen et al. 2014). The generalist's wages is an easier approach to estimate the value of unpaid work, because it includes all kinds of domestic work that is done in households. The average wage per hour, which is used to estimate the value added of unpaid domestic work, provide the simplified final results. The specialised worker's wages need consideration in defining the standards for the work done at home. It requires the decisions of, e.g. whether to use the wage of cook or kitchen helper to calculate the value of preparing food, planning menu, deciding ingredients or making up the dishes in households (Soinne 2021, Varjonen et al 2014).

The specialist's wages approach entails multiplying the average time spent on housework by the average hourly wage for professions and specialists related to household activities. The total value of domestic work is reflected in aggregation of the values estimated for different types of activities.

In the empirical results and in the literature dozens of detailed activities are gathered into 4 main groups of unpaid work, such as household upkeep, food preparation, making and caring for textiles (clothes and shoes), childcare and adult care. According to Eurostat recommendations also several activities related to volunteer work were taken into account in the estimation: unpaid help to other households, neighborly help, informal work in organizations, etc. (Eurostat 1999).

The average hourly wages of professions correspond to the services purchased by households on the market. If household members buy meals (lunch), they pay for the

total service (wages of canteen staff, cooks, waiters, etc.). The parallel grouping of activities in households and proper market wages were adjusted to each type of domestic work (Eurostat, 1999).

The daily, weekly and monthly formulas to estimate housework value by sex, activity on the labor market, family status by number of children, the level of education were calculated separately for all selected groups of respondents (Błaszczak-Przybycińska 2007, Varjonen et al 2014).

Daily value of domestic labor[3]

$$ {}_F\bar{t}^{z}{}_{laj} = \frac{\sum_{i=1}^{n_1} {}_F t^{z}_{ilaj}}{n_F} \tag{4} $$

$$ {}_M\bar{t}^{z}{}_{laj} = \frac{\sum_{i=1}^{n_2} {}_M t^{z}_{ilaj}}{n_M} \tag{5} $$

where:

- ${}_F\bar{t}^{z}{}_{laj}$ – duration of the *a-th* activity in the *j-th* group for *i-th* women from the *l-th* class in the *z-th* day of the week,
- n_F – the number of women in a subsample,
- ${}_M\bar{t}^{z}{}_{laj}$ – duration of the *a-th* activity in the *j-th* group for *i-th* men from the *l-th* class in the *z-th* day of the week,
- n_M – the number of men in a subsample,
- z – the day of the week; $z = 1,2,3$, where: 1 – Monday-Friday, 2 – Saturday, 3 – Sunday,
- j – group of domestic activities, $j = 1,2,3,4,5$.

*Weekly value of domestic labor***

$$ {}_F\bar{t}_{laj} = [\frac{5}{7}\,{}_F\bar{t}^{1}{}_{laj} + \frac{1}{7}({}_F\bar{t}^{2}{}_{laj} + {}_F\bar{t}^{3}{}_{laj})] * 7 \tag{6} $$

$$ {}_M\bar{t}_{laj} = [\frac{5}{7}\,{}_M\bar{t}^{1}{}_{laj} + \frac{1}{7}({}_M\bar{t}^{2}{}_{laj} + {}_M\bar{t}^{3}{}_{laj})] * 7 \tag{7} $$

where:

- ${}_F\bar{t}_{laj}$, ${}_M\bar{t}_{laj}$ – the average week time duration of the *a-th* activity in the *j-th* group for the *i-th* women and men from the *l-th* class,
- ${}_F\bar{t}^{1}{}_{laj}$, ${}_M\bar{t}^{1}{}_{laj}$ – the average duration of the *a-th* activity in the *j-th* group for women and men from the *l-th* class (weekdays from Monday to Friday),
- ${}_F\bar{t}^{2}{}_{laj}$, ${}_M\bar{t}^{2}{}_{laj}$ – the average duration of the *a-th* activity in the *j-th* group for women and men from the *l-th* class (on Saturdays),
- ${}_F\bar{t}^{3}{}_{laj}$, ${}_M\bar{t}^{3}{}_{laj}$ – the average duration of the *a-th* activity in the *j-th* group for women and men from the *l-th* class (on Sundays).

[3] *, **, *** – formulas are based on Błaszczak-Przybycińska 2007, Błaszczak-Przybycińska and Marszałek 2020, 2019.

*Monthly value of domestic labor****

$$ {}_{F}H_{l} = \frac{52}{12}\sum_{j=1}^{4}\sum_{a=1}^{n_a} {}_{F}\bar{t}_{laj}s_{aj} \quad (8) $$

$$ {}_{M}H_{l} = \frac{52}{12}\sum_{j=1}^{4}\sum_{a=1}^{n_a} {}_{M}\bar{t}_{laj}s_{aj} \quad (9) $$

where:

- ${}_{F}H_{l}$ – monthly housework value for a woman from the *l-th* class,
- ${}_{M}H_{l}$ – monthly housework value for a man from the *l-th* class,
- ${}_{F}\bar{t}_{laj}$ – average duration per week of the *a-th* activity in the *j-th* group for women from the *l-th* class,
- ${}_{M}\bar{t}_{laj}$ – average duration per week of the *a-th* activity in the *j-th* group for men from the *l-th* class,
- s_{aj} – hourly wage calculated for the *a-th* activity in the *j-th* group.

The International Standard Classification of Occupations (ISCO-08), which is applied in most countries, can be useful in defining the wages of professions or specialists. Whether we consider the generalist's wages according to ISCO-08 codes is proper to use wages of housekeepers (9111 – Domestic Cleaners and Helpers[4]). In Finland home-helpers or housekeepers wages are available (based on ISCO-88). The problems of housekeepers, who are employed by private households, are also related to "black market activities", which means that data and statistics on wages are not available.

Monetary value of unpaid domestic work is the most important part of the total non-SNA/non-market household production. The unpaid domestic work identified with *the gross value added in households* is calculated at 60–80% of non-market household production depending on the level of national development and social factors, e.g. tradition, gender. In more traditional societies the value of unpaid work will be higher because of providing care of elderly person or infants and children aged 6 and less by themselves at home.

Results from many different studies in Finland (Soinne 2021 and Varjonen et al. 2014, 2010, 2006, 1999), France (Poissonnier and Roy 2013), Germany (Schäfer 2004), Hungary (Szép 2003), Poland (Błaszczak-Przybycińska and Marszałek 2021, 2020, 2019), and Spain (Duran 2007) present that *the generalist's* and *specialist's wages* deliver equivalent estimates.

2.3. Consumption: intermediate consumption

According to ESA 2010, the intermediate consumption means that it was recorded as "completely used in the production process" at the end of the period (ESA 2010).

[4] Internet: UE ISCO-08 codes: https://esco.ec.europa.eu/pl/classification/occupation_main#overlayspin (accessed: 07/04/2025) and International Labor Organization ISCO-8 classification: https://ilostat.ilo.org/methods/concepts-and-definitions/classification-occupation/ (accessed: 07/04/2025).

In the Household Satellite Account the intermediate consumption was calculated separately for each group of household unpaid work. The monthly household's expenditures for different goods and services were selected and grouped into the same categories as unpaid work. The data of expenditures was obtained in household budget survey (HBS).

The intermediate consumption in the HHSA is calculated according to formula (10):

$$IC = i_{pop} \sum \bar{e}_a \tag{10}$$

where:

IC – total intermediate consumption in households for people aged 15 years and more;

i_{pop} – index of population for people aged 15 years and more (without people with disability),

$\sum \bar{e}_a$ – yearly sum of average expenditures on consumption for *a-group* of activities (household upkeep, food preparation, making and caring for textiles (clothes and shoes), childcare and adult care, volunteer work).

The intermediate consumption is an important part of consumption, because the products which are used in the production process are changed into new products (good or service). Households decide which products are treated as final products, and which take part indirect in the production process.

The second type of consumption is final consumption, which means the actual use of a product: wearing clothes or eating food. These products are used directly with their intended use.

2.4. Capital

Capital services made in household consist of two items: *consumption of fixed capital* (depreciation of cars, machinery and other equipment), and interest corresponding to the acquisition of capital. The Household Satellite Account contain only the consumption of fixed capital (Marszałek 2015, Varjonen and Aalto 2006, Eurostat 2003).

Varjonen and Alto indicated that total output of domestic services is increased by the consumption of fixed capital which reflects depreciation of home equipment, furnishing.

Polish HHSA 2011 presents the estimation of consumption of fixed capital in accordance with below formulas (Marszałek 2015):

$$C = \sum c_i * hh * hh_{xi} * d_{xi} * p_{xi} \tag{11}$$

where:

c_i – yearly capital consumption for people aged 15 years and more in *i-class,*

hh – number of households,

hh_{xi} – percentage of households having *x-good* in *i-class,*
d_i – percentage of depreciation *x-good* in *i-class,*
p_i – average price of *x-good* in *i-class*.

More appropriate for comparisons with national statistics (GDP, GVA) is *the output method*. The output method assumes that only results of productive activities which can be observed as the market final products (goods or services) are registered in the estimation of non-market household production. The crucial problem is how to define the results of each kind of activity. For example, the final product of cooking is meal, cleaning – clean apartment, ironing – ironed clothes. But what is the product of childcare or elder care, management of the household, preparing menu and ingredients for cooking, etc.? The findings are ambiguous and more expensive than the input method because they need more detailed surveys of final products in different fields of household unpaid work. The output method was applied in UK's Household Production Satellite Account that was dismissed after the experimental estimation of accounts in 2002 (Holloway, Short and Tamplin 2002).

3. Analysis and results

The analysis presents the most significant aggregates of Finnish and Polish Household Satellite Accounts. In Finland, the average *generalist's wage* of average monthly salary was used to calculate the value of unpaid work. In Poland, the gross value added of domestic work was estimated based on the *specialist's wages*[5] according to different types of activities and corresponding market wages per hour. The average wages per hour, used in Finnish estimates, amounted 13.44 EUR (in 2009), 14.53 EUR (2012), and 15.36 EUR (2016). These wages constituted 72.8%, 73% and 72.9% of average hourly wages by employer sector[6]. Also in Polish analyses the adequate proportion of professional wages (69.8%, 66.8% and 72.0%) was applied to estimate the unpaid household work by various approaches to consider which method is more accurate to the final estimation (Błaszczak-Przybycińska and Putkowska 2024).

The most important aggregates present *the gross value added*, *total household production* (SNA + non-SNA household production), and the share of household production in the national economy (and in the expanded GDP). According to data obtained from 2 waves of Harmonized European Time Use Survey[7] (2001 and 2009 for

[5] The different approaches were used in that analysis because various data and different calculation methods are available per country. Both approaches may be applied – *the generalist's wages* and *the specialist's wages* – as both are defined as comparable *input methods* (see Figure 1).

[6] Estimates are based on StatFin/Index of wage and salary earnings / 122k – Average monthly earnings by sector and gender, 2000-2023.

[7] So far, Eurostat conducted 2 waves of Harmonised Time Use Survey: HETUS 2000 (round 1, 1998–2006) conducted in 15 EU countries; HETUS 2010 (round 2, 2008–2015) conducted in 15 EU countries and 3 non-EU countries: Norway, Serbia and Turkey). The current wave of the European TUS is ongoing and has started in 2020.

Finland; 2003/2004 and 2013 for Poland), the gross value added of household production (market and non-market household production) in Finland 2009 amounted to more than 78 billion EUR, in Poland 2011 achieved 192 billion EUR (Table 2. and 3.). Of this, national accounts recognized almost 12.6 billion EUR in Finland, and 31 billion EUR in Poland. The remaining 65.8 billion EUR was excluded from national accounts in Finland, and 180.9 billion EUR in Poland 2011. This sum of household production would increase GDP by 39.9% (Finland), and 45.2% (Poland). The total amount of domestic labor in both countries depends on population. The population size in Poland is near 7 times larger than in Finland, so not monetary value but share of macroeconomic indicators might be compared in both countries. The wages and structure of non-market household production could be also compiled.

The gross value of domestic unpaid work is a major part of the non-market household production, and it achieved from 60.2% to 61.4% in Finland, and 58.1% to 58.7% in Poland. The similar proportion of the results confirm that the estimation using input method guarantee the international comparisons even of different approaches (the generalist's or specialist's wages) which were used in calculations.

In Finland, from 2009 to 2012, the gross value added (GVA) of household production at market prices increased by 9.7%, and from 2012 to 2016 increased by 19%. For Poland: 2011 vs. 2013 recorded the 4.9% decline and from 2013 to 2016 the 6.7% increase. GVA is the most informative measure of household impact on the economy. It reflects the monetary value of caregiving activities realized at home for children and other dependent people. Even if some part of care work was noted as secondary work in Time Use Survey and not fully valued in HPSA, then the total overview of proportion in market price of that work regular increases for Finland (in billion EUR): 65.8 in 2009, 73.1 in 2012, 78.8 in 2016, and for Poland (billion EUR): 31.1 in 2011, 31.6 in 2016 (Table 2. and 3.).

Furthermore, the value of domestic work related to childcare increased not only due to annual wage and inflation growth but primarily because of social recognition of this type of work as important for societal development. In previous decades (30–40 years ago), these tasks were not particularly appreciated, also because Poland had a relatively high birth rate and fertility rate (Szałtys and Cierniak-Piotrowska 2022).

Growing awareness of the importance of childcare in the context of social and economic development is evident. Currently, childcare focuses more on shaping attitudes, nurturing emotional development, enhancing children's potential, promoting educational and cognitive growth, and providing health services – particularly preventive care – rather than solely meeting basic and caregiving needs such as food provision, housing, and essential necessities.

The most interesting result of that analysis is the percentage of non-market household production in relation to GDP. In Finland, we observed almost stabile

relation: 39.9% in 2009, 40.1% in 2012 and 39.8% in 2016. For Poland, it was estimated at 45.2% in 2011, 44.4% in 2013 and 45.1% in 2016. This confirms that the domestic work made for own use at home without any market payment is a huge invisible productive resource. If we consider the concept of expanded GDP, which covers the traditional GDP measure plus non-market household production, then the share of total household production (both market and non-market) in extended GDP is calculated at 35% for Finland and 36–37% for Poland.

To conclude: the same level of household production share in the extended GDP obtained from independently conducted estimations confirms that both the valuation method (input methods) used and the choice of a specific approach (the generalist's or specialist's wages) allow for reliable assessment of the non-market contribution of domestic production to the national economy. Both approaches provide the basis for comparison between macroeconomic measures which are estimated in extended tables in the core national accounts as well as in the satellite accounts. The most significant difference between the generalist's and specialist's wage is that the first of them is simpler to calculate the value of domestic labor because of the use of average wages of specialist's to estimate it.

The generalist's wage is a more time-consuming and labor-intensive approach because it requires more intensive work and estimates to pair each specific domestic work (time use survey code of activity) with corresponding codes of occupations.

Other summarizing items in the sequence of extended tables in the Household Production Satellite Account are calculated according to the same formulas in both methods.

Table 2: SNA and non-SNA household production in Finland, 2009-2016 (EUR million)

Specification	2009	2012	2016
GDP (ESA2010)	181 029	199 793	216 111
Household production, total, EUR million	108 007	121 239	128 384
Gross value added of SNA household production	**12 563**	**13 784**	**16 398**
Gross value added of non-SNA household production	65 822	73 139	78 816
Gross value added of voluntary work (non-SNA)	6 368	6 973	7 286
Sum of non-SNA household production and voluntary work (non-SNA)	72 190	80 112	86 102
Total gross value added of household production (SNA + non-SNA)	**78 386**	**86 923**	**95 214**
Total gross value added of household production (SNA + non-SNA) and voluntary work (non-SNA)	84 753	93 896	102 500
Share of non-SNA household production of GDP (%)	36.4%	36.6%	36.5%

Table 2: SNA and non-SNA household production in Finland, 2009-2016 (EUR million) (cont.)

Specification	2009	2012	2016
Share of sum of non-SNA household production and voluntary work (non-SNA) of GDP (%)	**39.9%**	**40.1%**	**39.8%**
Expanded GDP (= sum of GDP and gross value added of non-SNA household production)	246 851	272 932	294 927
Share of household production of expanded GDP	31.8%	31.8%	32.3%
Expanded GDP including voluntary work (= sum of GDP and gross value added of non-SNA household production and gross value added of voluntary work).	253 219	279 905	302 213
Share of household production (including voluntary work) of expanded GDP	**34.3%**	**34.4%**	**34.8%**
The wage used in calculations (eur / hour)	13.44	14.53	15.36
Value of domestic work (unpaid work)	70 014	77 205	83 325
Output	114 375	128 212	135 670
Share of gross value added (unpaid work) of household production (%)	**61.2%**	**60.2%**	**61.4%**

Source: K. Soinne calculations, Statistics Finland.

Table 3: SNA and non-SNA household production in Poland, 2011-2016 (EUR million)

Specification	2011[a]	2013[b]	2016[b]
GDP (ESA2010)	377 189	388 356	424 803
Household production, total	277 456	278 438	308 005
Gross value added of SNA household production	**31 146**	**29 635**	**31 610**
Gross value added of non-SNA household production	160 880	162 214	180 631
Gross value added of voluntary work (non-SNA)	9 789	10 182	10 883
Sum of non-SNA household production and voluntary work (non-SNA)	170 668	172 395	191 514
Total gross value added of household production (SNA + non-SNA)	**192 026**	**191 849**	**212 241**
Total gross value added of household production (SNA + non-SNA) and voluntary work (non-SNA)	201 815	202 031	223 124
Share of non-SNA household production of GDP (%)	42.7%	41.8%	42.5%

Table 3: SNA and non-SNA household production in Poland, 2011-2016 (EUR million) (cont.)

Specification	2011[a]	2013[b]	2016[b]
Share of sum of non-SNA household production and voluntary work (non-SNA) of GDP (%)	**45.2%**	**44.4%**	**45.1%**
Expanded GDP (= sum of GDP and gross value added of non-SNA household production)	538 069	550 570	605 434
Share of household production of expanded GDP	35.7%	34.8%	35.1%
Expanded GDP including voluntary work (= sum of GDP and gross value added of non-SNA household production and gross value added of voluntary work)	547 857	560 752	616 317
Share of household production (including voluntary work) of expanded GDP	**37.5%**	**36.7%**	**36.9%**
The wage used in calculations (eur / hour)	-	-	-
Value of domestic work (unpaid work)	161 098	162 728	180 774
Output	277 456	278 438	308 005
Share of gross value added (unpaid work) of household production (%)	**58.1%**	**58.4%**	**58.7%**

a – estimates based on Time use survey Poland 2003/2024,
b – estimates based on Time use survey Poland 2013.

Source: own calculations.

The following figures are based on Finnish satellite accounts for 2006 (Varjonen and Alto 2010) and Polish Household Production Satellite Account for 2011 (Marszałek 2015). In 2016 the household sector in Finland delivered to the economy the value of unpaid work which was calculated at 83.3 billion EUR. Of course, it is invisible for the market value produced for own use or for other family members. If we compare that value of domestic labor to the household production, we will observe that it is 74.5% of the total output (Table 4). Finally, if we sum both market and non-market household production, we will achieve 61.4% of total output. It confirms that unpaid work is a significant part of the total result of productive activities of households. Estimates of the value of domestic work, which is a major component of gross value added (GVA), is also the most informative component of new production in the national accounts, and is calculated at 75-76% (Table 4.).

Table 4: Main aggregates of extended household accounts compared to SNA-based household accounts in Finland, 2016 (EUR million)

Components of household production	Household production		
	SNA (market production)	**Non-SNA** (non-market production)	**Total (SNA+non-SNA)**
Value of labor (number of hours x hourly wages)	◦	83 325	83 325
Paid domestic staff	◦	◦	◦
Housing services produced by owner occupiers (rents of equivalent rented accommodation)	8 444	◦	8 444
Own-account house construction	739	◦	739
Agricultural production for own use (hunting, fishing, picking berries and mushrooms)	160		160
Vehicle tax (part)		287	
Taxes on production	813	1	814
Subsidies on production	◦	-1 565	-1 565
Net value added	**10 155**	**82 048**	**92 204**
Consumption of fixed capital (depreciation)	6 243	4 054	10 297
Gross value added (GVA)	**16 398**	**86 102**	**102 500**
Intermediate consumption	6 818	26 352	33 170
Total output (household production)	**23 217**	**112 454**	**135 670**
Share of total output of total household production (SNA + non-SNA) (%)	17.1%	82.9%	100%
Share of housework of total output (household production) (%)	◦	74.1%	61.4%
Share of GVA of total output (household production) (%)	◦	76.6%	75.6%

Source: own calculations based on K. Soinne estimations, Statistics Finland.

Satellite accounts combine the interactions between market and households and explain the flows between household sector and the rest of the economy. The monetary value and amount of domestic goods and services can be compared to similar market products offered by private or public services. The significant disproportion between market and non-market household production is observed mainly in domestic work.

We made calculations for value of unpaid work (based on input method) and paid domestic staff (from national accounts). For Poland, we achieved more than 180 billion EUR of value of unpaid work and 526 million EUR of paid domestic services in 2016 (Table 5.). Only small part of total domestic work is registered in national accounts. Some of this production is non-registered (called "grey zone") because households do not employ officially workers, they pay for one day in a week as a support of house cleaning or for other domestic services.

Table 5: Main aggregates of extended household accounts compared to SNA-based household accounts in Poland, 2016 (EUR million)

Components of household production	**Household production**		
	SNA (market production)	**Non-SNA** (non-market production)	**Total (SNA+non-SNA)**
Value of labour (number of hours x hourly wages)	◦	180 774	180 774
Paid domestic staff	526	◦	526
Housing services produced by owner occupiers (rents of equivalent rented accommodation)	13 912	◦	13 912
Own-account house construction	11 807	◦	11 807
Agricultural production for own use (hunting, fishing, picking berries and mushrooms)	1 758	926	2 684
Taxes on production	1 598	251	1 849
Subsidies on production	-5 274	-5 784	-11 058
Net value added	**24 328**	**176 166**	**200 495**
Consumption of fixed capital (depreciation)	7 282	15 348	22 629
Gross value added	**31 610**	**191 514**	**223 124**
Intermediate consumption	40 844	44 036	84 881
Total output (household production)	**72 455**	**235 550**	**308 005**
Share of total output of total household production (SNA + non-SNA) (%)	23.5%	76.5%	100%
Share of housework of total output (household production) (%)	◦	76.7%	58.7%
Share of GVA of total output (household production) (%)	◦	81.3%	72.4%

Source: own calculations.

When considering the ratio of domestic work to the value of home production in Poland, analogous proportions to Finland were obtained. 76.7% of total output of non-market production was allocated in unpaid work, and 58.7% for output as a sum of SNA and non-SNA household production (for Finland: 74.1% and 61.4% respectively). In Poland the highest values were calculated in the share of GVA of total output (household production): 81.3% and 72.4% (Table 5.). This indicates that the value and amount of unpaid work in Poland has a higher impact on total household production than other categories, such as agricultural products, housing services produced by ourself, housing construction for own use, subsidies to domestic products or taxes on production. We also observe from the analysis that in Poland households spend more time on unpaid work, and the proportion of that monetary value to total household production is also higher than in Finland because GDP per capita in Poland is also lower than in Finland. If GDP per capita increases then people spend more time on paid work or leisure time activities (sports, hobby, travelling) than on domestic work, so they spend more money for market products than they produce goods or services by themselves.

Total output is a sum of gross value added and consumption of fixed capital (depreciation). Considering only the market (official) production by household sector, official statistics miss the additional 76.5% of total output (household production, both market and non-market) in Poland (Table 5.) and 82.9% in Finland (Table 4.). These calculations confirm that Household Production Satellite Accounts provide overall view and wider perspective of real household impact to the economy. The increase in the value in care and family care, as well as other domestic works in comparison to prices of market services, also affects the growth of social awareness that unpaid work is important as paid work. Therefore, regular estimates of labor and home production provide a better understanding of the economic interactions between market (public or private institutions) and households.

4. Conclusion and discussion

In particular, the issue of other kinds of estimating methods of non-observed productive activities (household production) in the economy remains one of the future research issues. Previous studies and analyses use different methods: input and output method, and in various approaches: replacement (market) cost or alternative cost method adopted the best practices and solutions to produce comparable figures. However, the core system of national account is still progressing – it is possible to choose the most appropriate harmonized method for group of countries, especially in the EU zone. Finnish, German, French and Polish recommendations are consistent with the Eurostat guidelines, which means that the input method is the most proper to

that kind of calculations and it should be implemented and developed. The analysis of this paper confirms that generalist's or specialist wages do not have crucial impact on final proportions of value of domestic work in the share of total output (household production). Also, share of GVA of SNA (market production) or non-SNA (non-market production) to total household production obtained in this estimation reflects similar proportions even if we used different wages in the input approach. The most valuable of that analysis is the confirmation that the input method is absolutely the most appropriate approach to provide further calculations as a sequence of accounts. If the input method is officially confirmed by National Statistics, then the further consideration of satellite accounts might be adjusted to the system of national accounts (SNA/ESA) and implemented.

The sector satellite account of household production – Household Production Satellite Account (HHSA) may fulfill the gap in core statistics because it is a comprehensive statistical tool to estimate the real economic value of domestic work and household production, both visible and invisible in the market and national accounts. The HHSA covers the market products and non-market goods and services which are made and provided in households. Moreover, satellite accounts generate a complete overview of final interactions and financial flows between market and households, and provide the European harmonized comparable figures to core national accounts (ESA).

Our recommendation is that the input method should take the first place in the satellite accounts and other detailed solutions should be developed and discussed, such as: definitions of household output, whole sequence of accounts (to economic analyses and forecasts), and the value of labor. The estimates of value of labor should be adjusted to available data, resources and regional (national) specifics. The approach based on the replacement (market) cost is recommended according to one of different types of calculation: generalist's or specialist's wages, depending on the available statistics in a given country.

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