Improving policy design: The behavioural levers of work-life balance policies in the Netherlands

A case study of the behavioural levers of work-life balance policies for Dutch households with young children

TU Delft

EPA Master Thesis

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Cover image

Front cover: Circle of smiling faces of children with heads together looking downwards.
Back cover: Child smelling a seedling

Improving policy design: The behavioural levers of work-life balance policies in the Netherlands

A case study of the behavioural levers of work-life balance policies for Dutch households with young children

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TU Delft

Preface

It all started when I got married, and then had a baby. About a decade ago, like most junior engineers just out of college in South Korea, I was barely interested in and only vaguely aware of the grand challenges that our world is currently facing, such as climate change. I was only concerned about securing my career prospects and earning a decent salary to prepare for the uncertain future. Then, I met my wife who is an artist and evoked in me the vision for the future that has been lurking inside me since long ago. We didn't want to live a life in a way that harms the future with our own hands.

Then, we got a baby boy and our house was quickly starting to be cluttered with stuff. Out of struggle to sort out the mess created by this little creature, we started to organise our life following the lessons of the minimalists. We cleared up our rooms, closets and cupboards. We started doing things by ourselves one by one instead of using devices, machines and services. We cooked more, travelled on our feet, grew our vegetable garden, fixed broken stuff on our own and tried to use secondhand as much as possible. It spread to other life practices such as consuming little meat and processed food, keeping in touch with only a handful of closest and true friends and most importantly, spending as much time with family as possible. We could feel our life becoming happier over time as we practice these things.

However, we also started to notice the remarkable indifference of most other people around us to the topics that we consider urgent and important. We didn't feel it is alright that everyone lives just like that as nothing serious happens. And as our son grew up, we started to feel more and more responsible for the future of our next generation. So we didn't want to actively participate in or turn a blind eye to the activities that destroy our world anymore.

At the same time, however, we also felt increasingly struggled to combine our beliefs about the good life and the hectic pace of life with an energetic and curious little boy. We thought that this might be why parents all around the world fail to teach the next generation about what we have to do to stop the looming collapse of our world: because we are too exhausted to become good parents and responsible citizens. So, I wanted to know how we can change our social systems in a way that keeps people from destroying the future of our children and instead encourages them to live better lives as parents and human beings.

This brought our family all the way to the Netherlands from the other side of the world. And the first chapter of our journey is now about to be concluded with this work. The process to finish this project itself was, ironically, plagued with the struggle that I wanted to tackle in the first place. However, despite all the obstacles and crises, I could finally end up bringing forward something that I can share with others who also have the same struggle as us. I hope this can provide guidance, if just a little bit, to anyone who seeks to make the world a better place, and also to my family heading for the next destination.

September 2022
Jaewook Seol

Executive Summary

Child upbringing in the era of the Anthropocene has become an expensive and exhausting job for parents. While people strive to protect the environment for future generations, the actual people who raise the future generations often find it hard to have the best of both worlds – being dutiful in childcare and responsible for the environment. Strikingly, it is found that parents have a bigger environmental footprint than other groups of people, due to the pressure on time and energy to care for their family after their work, often for both parents. This is problematic not only for their current environmental impact but also for the trans-generational effect of such a lifestyle, i.e. children get used to the energy-intensive lifestyle and continue live in such a way when they grow up.

This situation accordingly led to an increasing number of researchers paying attention to the role of public policy as a tool for guiding parents to live in a more pro-environmental way. While there are policies that aim to reduce the carbon footprint of industry and the market, there are few policies that target households directly to reduce their carbon footprint, as they are often considered to limit the right to choose as consumers and impose discomfort and inconvenience for them. However, since the carbon emissions from household consumption are one of the largest sources of all emissions, they have to share the responsibility of reducing their carbon footprint, especially considering their role in the transgenerational lock-in effect of the lifestyle.

Incidentally, the work and life balance (WLB) policies, which were introduced in the early 20th century and widespread across the developed countries after the two World Wars, are recently suggested to have a positive impact on reducing the carbon footprint of households by many researchers. Motivated by the recent development of research revealing the effect of WLB policies on household emission reduction, the current research delves into the way how the WLB policies in the Netherlands can more effectively achieve their policy objectives and thus help reduce household carbon emissions.

To understand how a policy could affect its targets, the analytical framework was established by a literature study of the behavioural levers, different types of policies and the factors that make policy addressee respond differently to a given policy. The COM-B framework of behavioural levers in policies tells how a policy wants to change the behaviour of the policy addressee desirably, by affecting either capability, opportunity or motivation to change their behaviour. With this in mind, policymakers then design policies primarily based on a certain type of policy using different tools, i.e. equipping, banning, incentivizing, informing or nudging and boosting. While policies are designed in this manner, some factors hinder the policy addressee from reaching out to these policies at either individual, societal-cultural or institutional levels, limiting the effective working of the behavioural levers identified above.

The research, therefore, wants to answer the following question: “How can the behavioural levers in the different types of work-life balance policies in the Netherlands help increase the effectiveness of policies?” To answer this question, the research takes an approach of mixed-method research consisting of a case study for work-life balance policies in the Netherlands, a documents analysis to identify the barrier factors to these policies, and a systems analysis to

establish the policy recommendations from the findings of the case study and documents analysis.

From the case study of the Dutch WLB policies to analyse the behavioural levers behind the policies, explanatory memoranda for each policy was taken from the Dutch parliamentary archive. It was found that the majority of the policies support parents either by financial incentives or granting rights to leave schemes and flexible work hours. Through these policies, the government aims to either afford a physical capability, create a social opportunity, or induce reflective motivation to take more part in unpaid work of childcare and mothers return to work. It was found that they lack the informing and nudging policy measures.

Document analysis of the grey and academic literature relating to the WLB policies and the barrier factors was conducted using the articles that contain the experiences of parents who faced difficulty in using these policy measures. The analysis revealed that the major factors that hinder parents to feel the effect of enhancing work-life balance through these policies are their financial situations and the prevailing cultural norms that perpetuate the gendered division of work and care. In addition, the analysis revealed that the current policies need a more compulsory or nudging nature compared to the voluntary basis of the current policies, and better informed by education campaigns or promotion plans, to make parents take more initiative for taking such policies and become more aware of the available options for them.

These findings are translated into a set of policy recommendations by constructing the system diagram of the policy measures, behavioural factors of the COM-B framework and barrier factors for households to take these policies. The recommended policies could be summarized as the three main streams: informing more about the WLB policies, integrating the multitude of the current policies and reinforcing the current WLB policies that have minimal provision available to working parents.

From the findings of policy document analysis and literature analysis and subsequent policy recommendations with the implications for household emissions, an agent-based model (ABM) was conceptualised by elaborating the relevant variables, entities, parameters and scenarios in a way that could facilitate the computational experiment. It would facilitate the construction of a model to reflect the key findings from the qualitative research and verify the findings against the variables based on real-world figures.

While this research pertains to novelty with its unique approach to policy effectiveness by combining multiple analytical frameworks and a selection of research domains, the study finds itself among the group of researchers who emphasized reducing policy hassles rather than adding more measures for more effectiveness and those who focused on the role of WLB policies in instigating the societal change to mitigate the crises. The study contributes to the scientific community by bridging the knowledge from multiple disciplines.

Acknowledgement

First of all, I would like to express my deepest appreciation to my first thesis supervisor, dr Nihit Goyal. Since he accepted my thesis proposal last year, he has always given me generous support and advice with great interest and enthusiasm until the final stage of the project. His encouragement and guidance during occasional moments of slumps and setbacks greatly helped me overcome those obstacles and continue working on the project to the last steps. I would like to say that he is indeed the person who shaped my vague idea into a tangible and comprehensible work in the form of a scientific method.

I would also like to other committee members, dr Amineh Ghorbani and dr Lisa Scholten. Even though my progress has sometimes been not up to my initial ambitions and expectations, they continued to give me invaluable advice and feedback on my working drafts and lent me their precious knowledge and experience to make sure the quality of the project. I especially thank Lisa for her input on the perspectives and knowledge of behavioural science, which came to be a central place in my thesis. I also thank Amineh for her thorough feedback down to the last details in our meetings.

I am also very grateful to all the faculty members of the EPA programme, especially the late dr. ir. Bert Enserink who first let me know about the existence of this programme and captured my attention through his excellent introduction to it. It is my honour that I could attend his lecture during his tenure and bring his insights into my work as well. I also owe much gratitude to his successor as the director of the EPA programme, dr. h.c. Haiko van der Voort, for his careful coordination of the programme and invaluable feedback on my thesis proposal as a reviewer. Thanks to his encouragement and guidance in the early phase, I could start my project in the right direction without losing sight of the ultimate goal.

I could not miss mentioning all the peer students of the EPA programme and the TPM faculty who shared the burden of the coursework during the unprecedented crisis of COVID-19, exchanged superb feedback and presented me with priceless experiences and memories of college life. Although I missed many exciting events and activities organised by young and enthusiastic colleagues, I could still learn a lot from them through numerous group works and discussion sessions in most of the courses.

Last but not least, I feel enormous gratitude and indebtedness to my wife, W and my son, Leo. They have endured my depressive yet nervous temperament all the time during my years of study, but they still gave me endless love, understanding and support that I desperately needed, much more than I deserve. I could come here from the beginning and end up at this step all thanks to their love, without which all of this would have not been possible at all.

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1 Introduction

It takes a whole village to raise a child.

An old African proverb

1.1 Introduction to the problem

1.1.1 Parents' role in climate change mitigation

The role of society in raising a child has been recognised over time, implying that we need to raise our children with the collective effort of society (Clinton, 1996). This principle is mostly recalled in the fields of education or sociology, but now it is starting to gain more relevance as we discuss the future of our society with the implications of climate change and looming societal disorder (DiMento & Doughman, 2014). This used to be framed as the responsibility of the current generation for future generations (Levin et al., 2012; Page, 1999). However, there is a growing awareness in academia that children are not only the subjects or victims of the environmental disaster caused by the past and current generations of adults, but they can become either perpetrators of the current systemic pollution or change agents of the transition (Martens et al., 2004; Nche et al., 2019; Torgler et al., 2008), which is famously exemplified by the TED speech given by a Swedish teenager climate activist Greta Thunberg (2018). Then 16-year-old schoolgirl called for the societal transition for the future of her generation in the reality of the collapsing world of the Anthropocene (Lewis & Maslin, 2015; Steffen et al., 2015), which is now gaining momentum of wider support in the general public under various movements such as the Deep Adaptation (Bendell, 2018).

With this in mind, the focus naturally moves to the parents, who provide the first "society" for a child and form the elemental unit of a larger society by forming a family with their children (Ebrahim, 1982). As it is commonly assumed that most parents strive to secure a better future for their children, it could be thought that parents generally have a pro-environment mindset compared to other adults. Some even argue that they have a "duty" to raise their children in a way that mitigates climate change (Cripps, 2017; Sanson et al., 2018). Surprisingly, however, many researchers have found that the contrary is true: Parents are often 'browner' than other citizens (Christis et al., 2019; Goldstein et al., 2020; Jones & Kammen, 2011; Martens et al., 2004; Nordström et al., 2020). Their findings are particularly worrying given that household is one of the major sectors of carbon emission across the globe (Christis et al., 2019; Goldstein et al., 2020; Long et al., 2018; Ottelin et al., 2019; Weber & Matthews, 2008; Zen et al., 2021).

1.1.2 Work-life balance policies for lower carbon footprint

Nordström et al. (2020) captured this strong tendency by comparing the carbon footprint of Swedish households consisting of a family with and without school-age children. The authors point out that 'satisfying immediate need under tighter time constraints' is the cause for parents to make less green choices in their lifestyle, thus urging future researchers to examine the emission-reducing effect of policies that alleviate their time crunch, such as increased access to childcare, flexible work hours for parents, etc. The kind of policies that address this particular target is called the *work-life balance (WLB) policies*, as they intend to help working parents strike balance between the duties of work and family life.

Recently many researchers pay attention to the link between the WLB policies and the carbon emissions of households. It is argued that a lifestyle with less work and less consumption has the 'double dividend' effect (Druckman & Jackson, 2016; Jackson, 2005) which can not only lead to improved life satisfaction but also reduce the carbon footprint of households. The researchers take a step further from there to find that the WLB policies can also promote the reduced environmental footprint of households by enabling this kind of lifestyle (Brough et al., 2008; Fremstad et al., 2019; Nässén & Larsson, 2015; Pullinger, 2009). Besides, it is also suggested that enhanced work-life balance can lower the materialistic value of individuals, conducive to more pro-environmental behaviour (Andersson et al., 2014).

Motivated by the impact of WLB policies on emissions from households with small children, this research thus aims to understand how the WLB policies are taking effect on households with children, what are the factors that keep households from reaching these policies and how these policies can improve its effectiveness in a real-world setting. To understand how the WLB policies intend to change the behaviour of the policy addressee, the concept of behavioural assumptions of policies (Olejniczak et al., 2020; Schneider & Ingram, 1990) is used for the analysis of the WLB policies. This perspective would enable one to identify whether a policy intends to supplement capability, opportunity or motivation to change their behaviour in a way that policymakers want them to (Michie et al., 2011). Knowing what kind of behavioural assumptions are present in the current set of policies can, therefore, shed light on designing new ones that can increase their effectiveness by tackling the behavioural assumptions that did not sufficiently address the needs of the policy addressee.

1.1.3 Case study with the systems analysis

To examine how such policies are implemented in the real world, a case study is an ideal methodology for investigating complex issues in real-world settings (Harrison et al., 2017). As a case study allows researchers to conduct a detailed analysis of the case over time within its context, it can present great insight and deeper understanding into the area of study that has seldomly been studied such as the topic introduced above. Thus, a case study of a real-world policy in use would provide evidence of the correlation, if not causation, between the WLB policies targeting families with small children and the factors that hinder the effective taking of these policies.

In analysing the effectiveness of such policies and drawing the policy recommendations, the systems analysis method (Enserink et al., 2010) will be adopted to facilitate a systematic

analysis of the policy arena. The method allows one to see how different policy levers interact with various internal and external factors to a problem in achieving their desired outcomes. In this thesis, the problem is viewed as the possibility to make use of WLB policies by households with small children, whose behaviour is governed by behavioural factors. Their interaction with the policy levers is affected by unfavourable external circumstances. By identifying the gap between the intentions of the current policy measures and the workings of the external factors, policy recommendations with new tools and better effectiveness could be established.

1.1.4 Conceptual modelling of the findings with the ABM method

Since the set of policies addressed by this research deals with the individual decision-making of numerous households affected by the policy measures, the collective effect of policy application in a larger population group could be tested with the agent-based modelling (ABM) method. The ABM method is acquiring increasing popularity and support among academia due to its ability to capture the emergent properties of a complex socio-technical system (Bankes, 2002; Epstein, 1999). In particular, the ABM method is widely adopted to study the effectiveness of energy transition policies by demonstrating how individuals or industries adapt to those policies by learning and interacting (Castro et al., 2020; Niamir et al., 2018). Since households with children generally tend to interact and learn from other families actively in workplaces and schools of their children, it is ideal to simulate their behaviour with the ABM method.

1.1.5 Relevance of the topic in the EPA programme

As the Engineering and Policy Analysis (EPA) MSc programme consists of dual tracks of technical and societal studies, the choice of topic is neatly aligned with the curricula of the programme. Especially given that the programme emphasises its role in addressing the grand challenges of our time, it is poignant to study this topic since it questions the way how our society functions to raise our children in everyday life and how could it be improved by relevant policy measures. The analytic techniques from the EPA coursework such as systems analysis are useful to address these problems, whereby the policy recommendations could be drawn out as a result. While most of the thesis topics in the EPA programme have concerned the rather narrow socio-technical issues and hence interest only a few techno-savvy experts, this topic can appeal virtually to every population for its relevance, as we share experiences of growing up as a child with time-squeezed parents.

In the following sections, the key concepts addressed in this research are studied in-depth by the literature review. This leads to the refinement of the main research question and directs readers to the sub-questions that follow. Then, the structure of the research is mapped out by the refined research question and sub-questions in the literature review. From these sub-questions, the approach taken for the research and the research design and methods is mapped out, with the summarization by a research flow diagram. Finally, the document concludes with the alignment and planning for the expected works defined in the previous sections.

1.2 Research question

Given the context provided in the introduction and the concepts elaborated above, the main research question that this thesis aims to answer can be formulated as follows:

"How can the behavioural levers in the different types of work-life balance policies in the Netherlands help increase the effectiveness of policies?"

The aim of the research is thus to understand the inner workings of behavioural levers of work-life balance policies in the Netherlands through the extensive case study. It is thus expected to contribute to academia and society by identifying how policies can be designed better to guide parents rearing children in a way that has less damage on our planet since it has hardly been studied so far but has a significant impact in tackling the climate crisis, considering the universality of child-raising. From this research question, now the detailed research approach including the sub-questions, research methods and plans for conducting them are outlined in the following sections.

1.3 Research approach

Mixed-method of case study and systems analysis method is taken in this research, combining the qualitative research of the case study and the analytic method (Mahoney & Goertz, 2006). The research will mainly focus on the extensive case study of the Dutch WLB policies using the analytical framework established in Chapter 2. To draw out the policy recommendations, a case of real-world examples of WLB policies will be investigated through the lens of an analytical framework. Therefore, this thesis project aims for the explanatory and descriptive approach to find the optimal set of behavioural levers that make policy goals align with real-world observations.

1.3.1 Research domain and data gathering

The research domain would be determined in the realm of both policy area and location of the policy. As the research gap originated from the work of Nordström et al. (2020), the policy area would naturally focus on 'work-life balance (WLB)' policies that help parents to balance their time between work and home. There has been an increasing number of researchers who tried to formulate the impact of WLB policies on household carbon emissions, either through the perspective of reduced working hours (Fremstad et al., 2019; Nässén & Larsson, 2015; Pullinger, 2009), time use (Druckman & Jackson, 2016) or the promotion of pro-environmental behaviour (Melo et al., 2018).

While these researchers empirically looked into the relationship between WLB policies and household carbon emissions, another set of researchers from the field of behavioural science explain the dichotomy between the intention to live a low-emission lifestyle and their commitment to take action in real life as the concept of a *behaviour-attitude gap* (Huang & Warnier, 2019; Langenbach et al., 2019; Wyss et al., 2022). The reason for this gap is explained by either 'dual processing' of effortless and laborious tasks in our brain (Kahneman, 2011) or

failure to 'self-control' between the 'want-to tasks' and 'have-to tasks' (Inzlicht et al., 2014) caused by ego depletion (Baumeister & Vohs, 2007; Inzlicht et al., 2014). The findings from these studies on the relation between the WLB policies and carbon emissions will therefore motivate searching and collecting the data for this research.

The geographic domain of the research would be the country of the Netherlands for some of its distinctive characteristics. First of all, the country is known as one of the most family and children-friendly countries in the world with the highest child well-being (Gromada et al., 2020) and the lowest weekly working hours (OECD.Stat, 2020). Secondly, the country is famous for its frugal attitude towards consumption, epitomised by the culture of splitting bills, ubiquitous bicycle riding and thriving second-hand shops. This social and cultural environment lends the country huge potential for the transition towards a sustainable lifestyle. However, despite its commitment to tackling climate change seriously, the Netherlands is still one of the members of the EU whose CO2 emission per capita is the highest (Climate Watch, 2021) and the share of electricity generated by the renewable source is the lowest (Moore et al., 2022). Therefore, it is of great interest to look into how its work-life balance policy and frugal consumption habit might contribute to achieving lower emissions. The choice of research domain for the case study is more elaborated in Chapter 3.

The data for policy analysis are mainly obtained from Official Announcements (Officiële bekendmakingen[1]), the online archive of the Dutch government for its official announcement of policies. Old news articles in the Netherlands are collected from Delpher[2], an online archive run by the National Library of the Netherlands (Koninklijk Bibliotheek). As some of the policies are implemented to rectify the Directives of the European Union, the legal documents from the Union are acquired at EUR-Lex[3], an official website of European Union law and other public documents of the European Union. To collect the articles for the document analysis of the barrier factors to the WLB policies, the academic and non-academic articles are collected mainly through the systematic search process on Google Scholar and Google.

1.3.2 Sub-questions

In the course of addressing the main research question, the following sub-questions will be answered to establish the ground for answering the main question. The sub-questions can be further divided by the phase of the case study and the phase of modelling.

- SQ1 How do public policies aim to influence behaviour?
- SQ2 How do work-life balance policies in the Netherlands aim to influence the behaviour of households with children?
- SQ3 What factors keep households with children in the Netherlands from utilising the work-life balance policies?
- SQ4 Which types of policy measures can better overcome the barriers for Dutch households with children to take work-life balance policies?

[1] https://www.officielebekendmakingen.nl/
[2] https://www.delpher.nl/
[3] https://eur-lex.europa.eu/

1.3.3 Research design and methods for each sub-question

The research would consist of 6 chapters in total. The overall structure of the research process follows the exploratory sequential design of a mixed-method research framework (Creswell, 2015; Merriam & Tisdell, 2015), as the qualitative policy data are collected first, and then the systems analysis is made based on an analysis of the qualitative data to establish the policy recommendations.

The first chapter introduces the research by providing the background context, problem definition and research design for the thesis project. In the second chapter, the analytical framework for the data needed for conducting the case study and the subsequent qualitative data analysis will be established by the systematic review of the literature. This will establish the foundation of the subsequent phases by providing the set of knowledge and information on the key concepts that are rooted in real-world cases. Then, in the third chapter, the data will be collected for each category of frameworks to identify the real-world examples in the study domain, resulting in an exhaustive understanding and the summarised data of it.

In Chapter 4, The collected data will be analysed to understand the current status to answer the sub-questions 1 and 3 and identify the gap in the policy implementations and experiences felt by the policy addressee, answering the sub-question 3. Then, Chapter 5 will lead to the recommended policies resulting from the findings of the previous chapter answering the sub-question 4 and will also produce the conceptualisation of the findings in the ABM formalism using the XLRM framework (Lempert et al., 2003). Lastly, the research will be concluded in Chapter 6 with a summary and discussions of the key findings, reflections on the existing literature, policy implications and suggestions for future research.

1.3.4 Research flow diagram

With the main research question and subsequent research questions being defined, the research approach that this thesis take is outlined and then summarised by a research flow diagram that shows the overall structure of the thesis work corresponding to the sub-questions defined above.

The research will be conducted in several phases consisting of different activities in each phase. Each of the activities will be covered by the corresponding chapters of the thesis. The types of work that are conducted at each phase are labelled as a literature review (LR), case study (CS), qualitative coding (QC) and agent-based modelling (ABM). The research question answered in the chapter is labelled. The main research question is labelled as MRQ and the sub-questions are labelled as SQ with numbers. **Figure 1** presents the complete research flow diagram as described above.

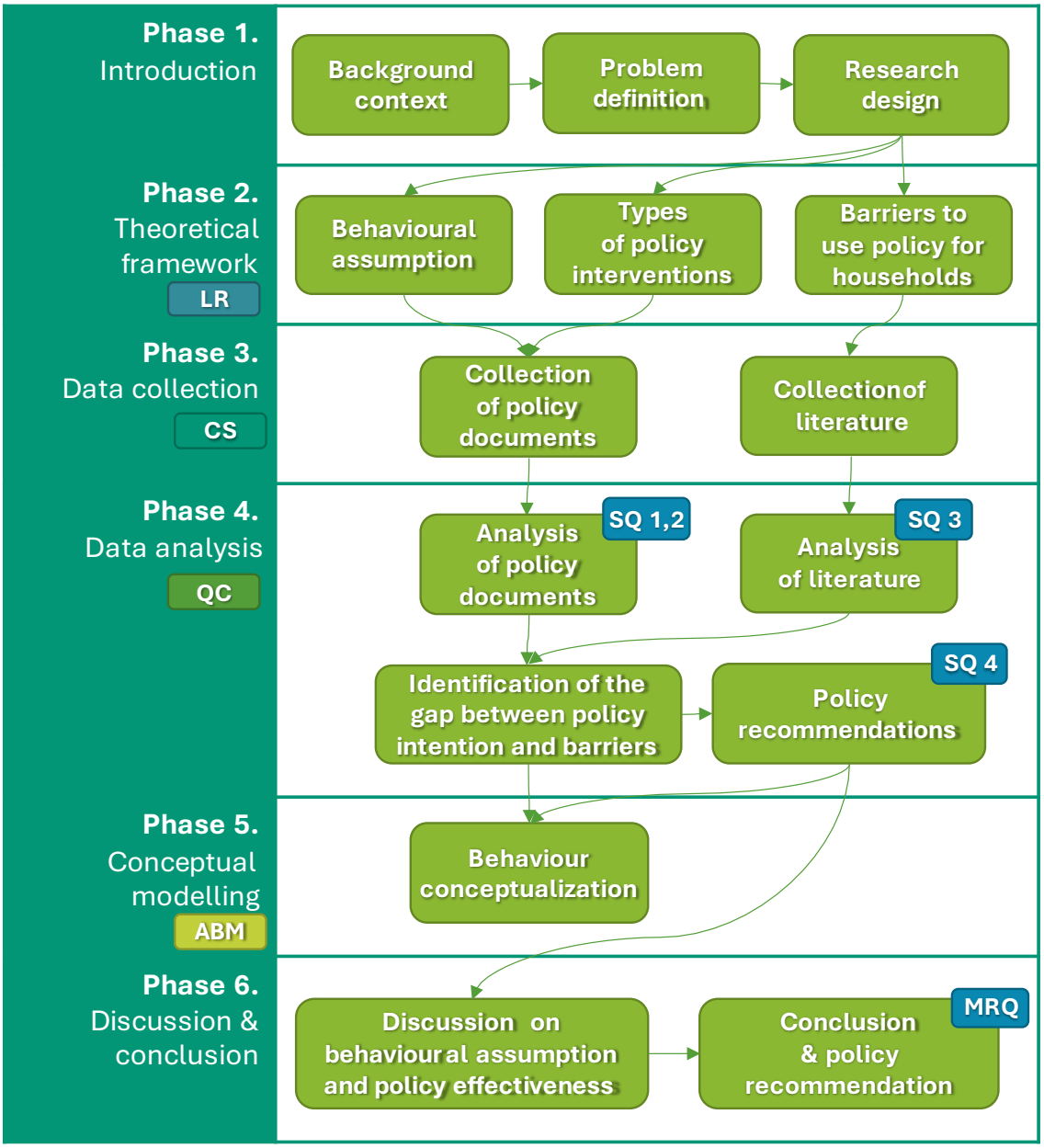

FIGURE 1 RESEARCH FLOW DIAGRAM

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2 Analytical framework

In this chapter, the analytical framework is established from a select range of works that have an important contribution to each of the analytical perspectives in this research, namely the behavioural levers of the policies, the types of the policy interventions and the barrier factors on household response to these policies. The established analytical framework will be tested by reviewing the scientific literature on *the effect of carbon footprint reduction policies on the behaviour of households* to understand and verify the application of the framework to real-world policy practices. As the analytical framework is established and verified through the literature review of the carbon footprint reduction policies, it can be used with confidence for the analysis of the work-life balance policy data in the subsequent chapter.

2.1 Search terms

The search was conducted in SCOPUS and Web of Science, resulting in twenty relevant articles on the selected topic as described above. To find the relevant literature, the following set of search terms were applied to the article title, keyword and abstract fields: the domain (climate change mitigation OR carbon footprint OR sustainable consumption OR emission reduction) AND the perspective (household OR family AND children) AND the policy (governance OR policy OR behavioural OR behavioral). To exclude the papers concerning health-related articles, the following search terms were also combined using NOT operator: health OR *health OR health* OR *health* in the article and source title. After leaving out some duplicates and out-of-scope papers from the search results, 16 papers emerged. The papers that provide insights for each of the aspects addressed in the questions above are identified by scanning the titles, abstracts and keywords and discussed in the following paragraphs.

2.2 Behavioural lever

The behavioural lever is the basis for the policy design to guide a certain behaviour of the public who are subject to the policy (Olejniczak et al., 2020; Schneider & Ingram, 1990). Olejniczak et al. (2020) adopts the COM-B framework by Michie et al. (2011) for the policy design. The framework, as depicted in FIGURE 2, demonstrates that behavioural change can result from three main factors: capacity, opportunity and motivation. These behavioural factors can be further divided into subcategories: physical & psychological capacity, social & physical opportunity and automatic & reflective motivation.

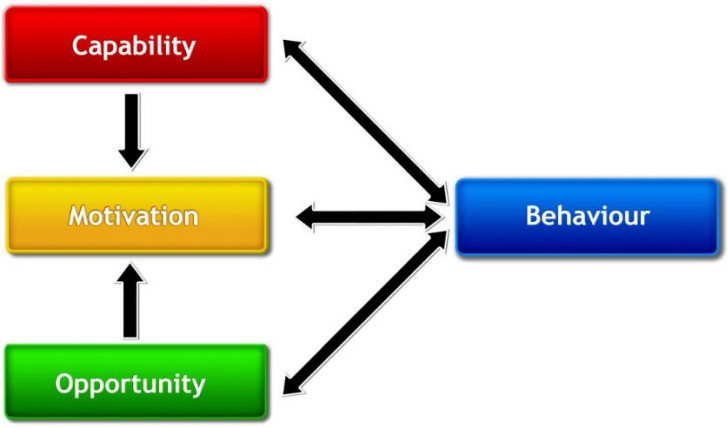


FIGURE 2 COM-B MODEL (MICHIE ET AL., 2011)

The studies that address the behavioural changes caused by a policy implementation can be understood using this framework. These studies are mapped out in TABLE 1 as a demonstration of this framework. The definitions of the factors and the logic for mapping the policies onto the table are further elaborated in the following paragraphs.

TABLE 1 BEHAVIOURAL ASSUMPTIONS IN SELECTED STUDIES USING THE COM-B FRAMEWORK

Author (Year)	Behaviour change	Capacity	Opportunity	Motivation
Streimikiene and Volochovic (2011)	Reducing household emission	Tailored information	Eco-labelling Info. campaign	No cost Feedback
Williams (2015)	Paying for extra electricity bill	Income Gender Education	International participation	Reducing the use of cars, energy Loss of biodiversity
Luo et al. (2021)	Adopting biogas at home	Extra space Awareness	Education level	Social/ economic difference
Xu and Lin (2021)	Paying extra for carbon-labelled products	Gender Children Trust	Publicity through mass media Education in school	-

For instance, Streimikiene and Volochovic (2011) propose several different types of policy measures to promote household energy savings in Lithuania. To make households reduce emissions, the authors found that the government should give 'capacity' to be aware of the necessity by providing them tailored information. They also suggested that giving feedback on their energy use at no cost will also help, which falls under the 'motivation' part of the COM-B model. Lastly, institutions such as eco-labelling and information campaigns will establish a social environment that encourages households to change their behaviour, thus could be labelled under 'motivation'.

Stankuniene et al. (2020) systematically reviewed the barriers to changing household behaviour and suggested policies that can help overcome those barriers. They grouped the models of behaviour change for policy development into five categories. Then, they grouped

policies that are based on those behavioural models into four groups and identified the barriers to behavioural change that those policies are aiming at the individual (internal) level, which is similar to the work of de Vries et al. (2020), and societal (external) level. They also urged policy-makers, stating that the current energy-efficiency regulations alone are not enough, to develop measures to change the behaviour of households.

Some authors focused on the concept of willingness to pay extra/adopt changes of households to reduce emissions for the design of household emission reduction policies (Luo et al., 2021; Williams, 2015; Xu & Lin, 2021), which also reflects the aspect of the behavioural assumption that willingness to pay or adopt would be different among households having different characteristics. Similarly, the works of these authors also could be interpreted with the COM-B model. Setting the 'willingness' parts as the desired behaviour changes, these studies identify capacity, motivation and opportunity as the model parameters to predict the willingness of households to change behaviour. Policy suggestions from these papers often provide 'opportunity', i.e. infrastructure and/or social environment, for the households to adopt new behaviours proposed by the authors.

Similarly to the COM-B model, Stankuniene et al. (2020) proposed their theory of the barriers to changing household behaviour and suggested the policies that can help overcome those barriers. They grouped policies that are based on various behavioural models into four groups, i.e. motivation for voluntary mitigation, habits change, economic incentives and lifestyle change. They then identified the barriers to behavioural change that those policies are aiming at an individual (internal) level and societal (external) level, which is also proposed by Olejniczak et al. (2020) and de Vries et al. (2020).

2.3 Types of policy interventions

Different types of policy measures that are implemented in the public policy arena could be framed using the typologies popularly adopted by policy scholars. Capano and Engeli (2021) classified the five most-used policy typologies into two groups: those that focus on the level of 'government resources' and those that seek the most performant 'behavioural driver'. Even though there are a plethora of competing typologies to compare policy measures, the authors assert that the typology for the policy analysis should be selected by researchers considering the conceptual treatments and methodological trade-offs in their research.

As this thesis project aims to explanatory analysis of the behavioural driver of household sectors, the typology based on the behavioural assumption proposed by Schneider and Ingram (1990) would be adopted. However, the nomenclature for policy types is borrowed from those proposed by Olejniczak et al. (2020), including two additional types of *nudge* and *boost*. Even though *nudge* and *boost* could arguably be considered as a type of informed policy and thus not considered as separate policy types (Capano & Engeli, 2021), they are still considered to be innovative new types as they are based on the recent development of behavioural science (Olejniczak et al., 2020). In the following paragraphs, with the typology in mind, the selected

articles from the search result that compares different policies are examined in the context of the COM-B framework. The articles are mapped onto the analytical framework with COM-B labels on the left-hand side and the policy categories from Olejniczak et al. (2020) on the right-hand side as in TABLE 2.

TABLE 2 MAPPING OF THE COM-B FRAMEWORK TO THE IDENTIFIED POLICIES

COM-B Component		Policy category				
		Equip	**Ban**	**(Dis) incentivize**	**Inform**	**Nudge/ Boost**
Capability	Physical		Plastic bag levy	Eco-tax	Instruction	Eco-labels
	Psychological	Environmental education Tailored information			Information campaign	
Opportunity	Physical			Pay-by-use waste charge		Eco-labels
	Social	Education in school		General taxation Subsidy	Publicity through media	
Motivation	Automatic					Defaults
	Reflective			Reward	Feedback	Context reframing

Stankuniene et al. (2020) illustrate the overview of the climate change mitigation policies to overcome the barriers to behavioural changes in households in six categories. Although they do not explicitly mention the behavioural assumption, their categorisation of the identified policy measures is in line with those from Olejniczak et al. (2020), with an emphasis on nudge and boost albeit not as separate measures. They framed the challenges of policy performance as 'barriers' at an individual and societal level and suggested six categories of policies to overcome those barriers. While this reasoning for barriers can correspond to the COM-B model, they put more emphasis on inducing behaviour change more effectively using nudges and boost in the types of policies they identified.

Wynes et al. (2018) also conducted a literature review work for behavioural interventions to reduce non-pro environmental behaviours (BEPs), such as driving personal vehicles, meat consumption, and household energy use. They classified the types of intervention for behaviour change into eleven categories, of which seven interventions were found in the papers from household energy use studies. They found that among the measures that aimed to reduce household energy use, instructions (or tips), feedback and rewards were the most studied and effective measures as household energy use is easy to quantify and monitor through the utility providers.

Pape et al. (2011) compared the effectiveness of three key types of policy instruments – legislative, economic and communicative – to propose the sustainable consumption policy framework in Ireland. They argue that the top-down, government-led nature of policies and instruments discourages active participation by consumers and households, thus participatory and interactive approaches to the policy have advantages as they directly face all the policy actors. This is indeed in line with the findings from the recent literature review studies discussed above. However, economic measures are still one of the most important measures as they are widely used conventional measures and can be much more effective for non-environmentally motivated households (Stankuniene et al., 2020). Geyer-Allely and Zacarias-Farah (2003) also recognized the extra importance of economic measures over social and regulatory ones while emphasizing that the implementation of policy packages is desirable.

Owen and Barrett (2020) provide interesting insight into the economic measure for the household emission reduction policy. They compared the effect of three different low-carbon policies on household disposable income to find out how to reduce inequality resulting from those policies. They found that among the three options implemented in the household low-carbon policies – proportional taxation to energy bills, weighted contribution by the household carbon footprint, or general taxation according to income – the third option works best for the low-carbon future and addressing inequality.

As can be seen here, most of the policy measures that were currently implemented by policymakers or suggested by researchers are those of the economic incentive and information policies and lacks legislative measures. It shall be thus interesting to look for an existing or suggested case of legislative measures for households as it is deemed to be one of the most effective measures to induce behaviour change in individuals (Dubois et al., 2019).

2.4 Barrier factors on household response

To identify the factors that keep policy addressee to approach policies, den Dulk and Yerkes (2016) took the capability theory (Robeyns, 2005), which shares a similar analytical framework to the COM-B model. The theory explains that individual freedom to achieve a certain goal depends on their resources which are not always able to be used by them. There are ‘conversion factors’ that turn the resources they have into a capability to get the desired outcome, i.e. the work-life balance in this case.

They grouped these factors into three categories. First, *individual factors* include gender, age, ethnicity, social class and employment status. Second, *societal-cultural factors* mean norms and values in a society, such as gender norms and the ideal of full-time motherhood. Third, institutional factors are the policies and administrative processes that govern the capability of the individuals. They include not only policies themselves but also the background to those policies such as organizational context and time/space flexibility. The papers from the search results are thus looked at through the lens of these three categories.

Firstly, the studies that tried to quantify the carbon emission from households as a groundwork for the national energy policy usually included one or more societal-cultural factors as their focus of interest. For instance, Shigetomi et al. (2021) investigated the impact of lifestyle choices on household emissions in Japan. Both Zhou et al. (2021) and Zen et al. (2021) focused on demographic factors, household size in China and income variance by neighbourhood in Malaysia.

Some papers focused on the individual factors to understand the behaviour of policy targets. For instance, Aruga et al. (2021) surveyed the Polish population to experiment with the perceived trade-offs of national energy policy options. They identified the different preferences among different population groups, such as gender, age, educational level, income, and having children or not, which could be mostly attributed to an individual level. Holian (2020) looked into the American Community Survey data to investigate the relationship between personal vehicle ownership and population density, suggesting the impact of land-use policy on household carbon emissions.

Lastly, the kinds of factors discussed in Sections 2.2 and 2.3, such as mostly fall under institutional factors as they concern the experiences of policy targets at an institutional level. For instance, the three types of policy measures categorised by Pape et al. (2011) and the five policy typologies proposed by Capano and Engeli (2021) discuss these measures and their effects on the policy addressee at an institutional level, explaining the limited effectiveness of these policies through the institutional, i.e. administrative, legislative, economic, regulatory and/or communicative factors.

As the analytical frameworks consisting of the rationale behind the behavioural levers with the COM-B model, the seven types of policy interventions matched to the behavioural levers and the three categories of barrier factors are now established and examined to see how they could be usefully deployed through the literature review of a similar policy area, they could be extensively used for the case study of a selected research domain in a policy and geographic realm, i.e. the work-life balance policies that greatly affect households with children in the Netherlands, in the subsequent chapter.

3 Methodology

3.1 Research domain

This chapter will establish the groundwork of the research by specifying the research domain in the policy area and by substantiating the selection of a subject for the case study. From this, the detailed data of the policies in effect will be collected and then analysed through the perspective of the COM-B framework elaborated in the earlier chapter. Lastly, a conceptual model will be developed from the result of this analysis in the subsequent chapter.

3.1.1 Policy domain: Work-life balance policy

The research domain in the policy area was chosen by considering the following three factors: (1) relevance to the impact on carbon footprint, (2) whether the policy addresses households with children as its target and (3) whether the policy has been implemented widely enough to allow a detailed analysis of its behavioural assumptions. Among the possible candidate policy areas that could satisfy those three criteria, the set of policies that can be grouped as work-life balance (WLB) policies was chosen to be the policy instrument to investigate.

Though at first glance the link between WLB policy and the carbon emission of households seems not quite obvious, there is a growing body of research that reveals the significance of WLB policies, and more broadly personal well-being in general, in reducing the emission of households. The body of research on the lifestyle of *downshifting* and *voluntary simplicity* (VS) has long argued the 'double dividend' (Druckman & Jackson, 2016; Jackson, 2005) of reduced working hours and consumption that leads to improved life satisfaction as well as benefits to the environment (Kennedy et al., 2013). While these kinds of lifestyles are adopted voluntarily by individuals, the types of policies that enable individuals to pursue those lifestyles are also evaluated to be effective in promoting reduced environmental footprints, by resulting in fewer working hours and less consumption (Brough et al., 2008; Fremstad et al., 2019; Nässén & Larsson, 2015; Pullinger, 2009). Furthermore, it is also suggested that enhanced work-life balance can lead to more pro-environmental behaviour by lowering the materialistic value of individuals (Andersson et al., 2014).

There are also a set of studies that could explain how WLB policies could cause excessive carbon emissions of households from the behavioural science perspective. The time crunch households with small children often suffer could make these parents either favour the lifestyle of carbon-intensive consumption or fail to take action to adopt a low emission lifestyle even if they have the intention to do so. From this point, a range of studies strives to answer this "attitude-behaviour gap" in pro-environmental behaviour.

Firstly, the theory of "dual processing" in our cognitive process distinguishes the easy, fast and automatic process is favoured over the slow, laborious, difficult and deliberate process by our brain, which is famously introduced as "system 1" and "system 2" thought process by Kahneman (2011) and "nudge" theory by Thaler and Sunstein (2009). According to this theory, the low-emission, pro-environmental behaviours are viewed as a system 2 process that requires more effort for our brain.

Another cognitive theory of self-control explains this failure in the self-control of engaging in 'difficult' tasks stems from the fact that our cognitive process has evolved to strike an optimal balance between laborious 'have-to' goals and pleasurable 'want-to' goals as our ancestors needed to switch between the periods of exploring the new resources ('have-to' goals) and exploiting the stored resources ('want-to' goals) (Inzlicht et al., 2014). In that respect, parents have to deal with 'have-to' tasks not only at work but also for caring for their children, which forces them to switch to 'want-to' goals when they face the choice between high and low emission lifestyle outside work and care duties – a situation called as 'ego depletion' in a traditional resource model of cognitive science (Baumeister & Vohs, 2007; Inzlicht et al., 2014). Indeed, this cognitive perspective of pro-environmental behaviour is recently put under the limelight by many researchers (Chuang et al., 2016; Gómez-Olmedo et al., 2021; Langenbach et al., 2019; Wyss et al., 2022).

The findings that directly looked into the household carbon emissions and work-life balance as well as the insights from behavioural science make the WLB policies relevant a subject of research concerning household carbon emissions as other energy policies.

The reason WLB policies make a significant contribution to household carbon emissions is based precisely on the fact that the WLB policies address households with children. Historically, as the participation of women in employment increased from the mid-20th century, the WLB policies have emerged in the developed world to relieve the burden of the child-rearing needs of mothers as well as encourage them to participate in employment for the economic boost after the two world wars (Crompton & Lyonette, 2006). This naturally makes the target group of WLB policies the households with children, which coincides with the groups of people who make choices to live the lifestyle of downshifting and voluntary simplicity as well as the focal research subject of this study.

In the developed world where the rapid economic growth was accompanied by the increased role of women in economic activities, the WLB policies have been developed progressively through the course of the late 20th and early 21st centuries to enhance gender equality as well as productivity of the national economy (Crompton & Lyonette, 2006). This trend has been more prominent in Western European and Nordic countries, hence a long history and wide adaptation of WLB policies in these regions. According to the Better Life Index survey conducted by the Organisation of Economic Cooperation and Development (OECD), among the ten highest countries in work-life balance rank, 9 out of 10 countries are located in this region (OECD, 2020). Thanks to the mature academic and journalistic milieu of those countries, a relatively rich amount of research articles and policy documents on WLB policies are readily

available in English from these areas as well. This in combination with the aforementioned characteristics of WLB policies makes the WLB policies an attractive research subject.

3.1.2 Case selection: the Netherlands

The subject country for the case study of the implemented WLB policies was selected to find a representative case that can relate to each of the research domain criteria, i.e. (1) relevance of the country in global carbon emissions, (2) prominence of households with children as the policy addressee in the given country and (3) prevalence of WLB policies that have long been practised for a wide population. In light of those three aspects, along with the reputation of the country for having a nice work-life balance for employees (OECD, 2020) and the happiest children in the world (Acosta & Hutchison, 2017; Adamson, 2013; Gromada et al., 2020), the country of the Netherlands was found to be the most favourable candidate that fits all the criteria outlined above.

Firstly, the Netherlands has relatively high per capita greenhouse gas (GHG) emissions in the world as well as a high level of household expenditure, positioned 31st and 21st place in global rank respectively (Climate Watch, 2021; World Bank, 2015), which suggests the country has a high level of household GHG emissions. The high level of GHG emissions and household expenditure is a characteristic also shared by most developed countries. This puts the country in the typical case of a high-income country with high consumption and emission profile.

Secondly, the Netherlands has a relatively strong emphasis on family and childcare policies compared to other countries, which allows the country to boast of having the best work-life balance and the happiest children in the world. Although the proportion of households with children is steadily decreasing in the Netherlands over the last few decades and the figure is also comparatively smaller than the other European countries (Eurostat, 2022), the country still offers better policies that ensure good childrearing conditions (Gromada et al., 2020). In addition to that, while there are an increasing number of households without children, Dutch households that decide to have children tend to have more than one child (Eurostat, 2022), rendering childcare policy more pronounced in the national welfare policy target.

Lastly, the Netherlands is a country famous for its high productivity despite short weekly work hours. This makes the country attractive for many expatriate workers who move to the country to enjoy balanced life between work and family. However, this is not the only factor that makes the country proud of its international appeal. the Netherlands also provides a wide range of policy options for parents who wish to keep a good balance between work and family life (OECD, 2020). In addition, the policies are implemented based on the written national law and detailed guidance on those laws is provided from the government website, which allows researchers to easily conduct policy analysis.

3.1.3 Selection criteria for WLB policies

To collect the data on Dutch work-life balance policies, there needs to be an understanding of what kinds of policies are categorised as work-life balance policies. Types of work-life balance policies can be grouped into four different categories as summarised in **TABLE 3** (Brough et al., 2008; Gray & Tudball, 2003).

TABLE 3 FOUR TYPES OF WORK-LIFE BALANCE POLICIES (GRAY & TUDBALL, 2003)

Policy categories	Examples
Flexible/alternative work arrangements	Flexible work hours, part-time work, remote working
Paid and unpaid leave arrangements	Paid maternity, paternity, adoption leave, unpaid leave for sabbaticals, cultural, or volunteer reasons
Dependent care services	Provision or subsidy of childcare or elder-care services
Access to information, resources or services	Employee assistance programmes, health facilities and stress management programmes

The first one is flexible or alternative work arrangements, such as flexible work hours, part-time working and remote working. These policy options provide workers with more freedom to use their time at their discretion, enabling them to care more about family while maintaining their careers. While there are setbacks in some countries that make employees hesitant to take advantage of it, such as financial worries or disadvantages in promotion, this is still the most widespread WLB policy. The second type of policy is paid and unpaid leave schemes that can be taken by employees for various reasons, including mostly care needs for the family. Though taking leave schemes is generally considered to be a kind of basic right of employees, it is treated as a WLB policy especially when it is taken for family care needs, such as maternity and paternity leaves. The third type of WLB policy is dependent care services, such as the provision or subsidy of childcare or elder-care services. In many countries, this takes the form of providing free or subsidised childcare and elder-care services and handing out subsidies or tax deductions to people with caregiving responsibilities. Lastly, there is a policy that gives access to information, resources or services to help caregiving employees. For example, there could be programmes to help employees take care of children, and manage physical and mental health run by public or private organisations.

While the former two types of policies give workers more available time for family care, the latter gives them more resources to reduce their needs for family care, hence fulfilling different parts of behavioural change factors in the COM-B framework. A deeper look into the different COM-B fulfillments of each policy option is shown in Section 4.1.

When considering the WLB policies in the Netherlands, policies enforced mandatorily by the Dutch government shall only be included. Since the voluntary WLB policies implemented in the private sector could vary by employers or industries, it lacks consistent behavioural assumptions behind the policy implementation other than attracting more competent talents from the job market. How data on the public policies concerning work-life balance in the Netherlands and the corresponding response from households will be collected is elaborated in the following section.

3.2 Data collection

In this section, the methods of policy data and household behaviour data collection are elaborated on in detail. This will take the form of the case study of current Dutch WLB policies in practice to establish the groundwork for conceptual model building in the subsequent phase. Data will be collected in two parts: First, from the policy documents available from the official online sources to understand in what background and intention the policy was introduced. Then, to understand how these policies worked in reality and what constraints limited their effectiveness, the academic and grey literature analysis and the interviews with the relevant stakeholders, ranging from government officials, policy experts and journalists to policy addressees, i.e. parents who have experience raising children in the Netherlands will be performed.

3.2.1 Collection of policy data

Policy data will be collected by following the guideline set up in Section 3.1.3. First, the policies that could be categorised in one of the policy categories from Table 3 will be identified by examining the list of government policies available on the government website by topic.[4] The website provides general explanations about their policy agenda, such as their intended targets, accompanied administrative procedures and responsible government departments or public organisations.

3.2.1.1 Selection criteria for policies

To analyse the policy documents, the range of policies to be included was determined first. At first, the types of policies that are largely related to the work-life balance of employees directly or indirectly were all considered, despite the work-life balance or care needs not explicitly mentioned as their purpose. For instance, the kind of policies such as student loans, student housing and old-age pension might indirectly affect the work-life balance of employees by allowing them to save less for the future of their children and their own. Likewise, the primary education system in the Netherlands allows parents to spend more time on their own by sending their children to school from as early as four years. However, it was later decided to focus on the types of policies that are directly linked to childcare and the work-life balance of employees to make the connection between the work-life balance and emissions from the households more explicit. The complete list of policies taken from the website of the Dutch government, and the law that the policy is based on, is shown in **TABLE 4**.

[4] The Dutch government policy agenda are available by topic from its websites: https://www.rijksoverheid.nl/onderwerpen (in Dutch) and https://www.government.nl/topics (in English). It should be noted that Dutch version of the website contains more topics about work-life balance, so the information from the Dutc language website was consulted using the automatic translation by Bing browser.

TABLE 4 LIST OF POLICIES SELECTED FOR THE ANALYSIS

Policy	The original name of the policy in Dutch	The law that the policy is based on
Child benefit	Kinderbijslag	General Child Benefit Act
Childcare allowance	Kinderopvangtoeslag	Childcare Act
Child budget	Kindgebonden budget	Child Budget Act
Birth leave (partner leave)	Geboorteverlof (partnerverlof)	Work and Care Act
Pregnancy and childbirth leave	Zwangerschapsverlof en bevallingsverlof	Work and Care Act
Adoption leave and foster care leave	Adoptieverlof en pleegzorgverlof	Work and Care Act
Emergency leave and short absenteeism leave	Calamiteitenverlof en kort verzuimverlof	Work and Care Act
Parental leave	Ouderschapsverlof	Paid Parental Leave Act
Working hours	Werktijden	Flexible Work Act

3.2.1.2 Consulted sources

Since most of those policies are based on a specific national law or decree, these legal texts were initially gathered to identify the underlying assumptions behind those policies. However, as the legal texts only dealt with the specific technical and legislative details about the execution of these policies, other types of documents such as explanatory memoranda and parliamentary debates published in the official gazette of the Dutch Government and the archived news articles for older laws were consulted.

To search the relevant documents from the official sources, the original policy names in Dutch were used as the search term in the Dutch governmental archive website for its official announcements.[5] In the case of the policies that were first introduced more than half a century ago, such as the child benefit (Kinderbijslag) that were first implemented in 1941, the archived news article from the website called Delpher[6], an archive website run by the National Library of the Netherlands (Koninklijke Bibliotheek), was used as a source instead, as the official gazette from this period was not available from the government website.

As those texts from the official sources are only available in the Dutch language, they should be analysed using the automatic translation by the translation engine of Google, available from the embedded function of the Chrome web browser. There are several machine translation (MT) services freely available online from service providers such as Google and Microsoft. Although there is no quality assessment for the Dutch-English MT available from the literature, several studies suggest that Google is currently the dominant player in the market as it generates the most reliable and robust quality of MT (Pecina et al., 2014; Rivera-Trigueros, 2022).

[5] Offical announcements (officielebekendmakingen) website: https://www.officielebekendmakingen.nl/
[6] Delpher website: https://www.delpher.nl/

In total, seven policy documents for the nine policies were selected for analysis. The list of documents for each of the laws is listed in **TABLE 5**. Note that the title of the documents and the name of the laws are machine-translated using the translation engine embedded in the Chrome browser provided by Google.

TABLE 5 LIST OF POLICY DOCUMENTS

Law	Document title	Source
General Child Benefit Act	CHILD BENEFIT INSURANCE REGULATORY BY LAW	Algemeen Handelsblad (14-12-1938)
Childcare Act	28 447 Regulations regarding allowances for the costs of childcare and guaranteeing the quality of childcare (Basic Childcare Provision Act), No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (02-07-2002)
Child Budget Act	30 912 Rules regarding entitlement to an income-related financial contribution towards the costs of children (Child Benefit Act), No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (21-12-2006)
	31 772 Amendments to the Child Budget Act, the Education Contribution and School Expenses Allowance Act and the Student Finance Act 2000 in connection with the integration of Chapter 3 of the Education Contribution and School Expenses Allowance Act into the Child Budget Act, No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (24-11-2008)
Work and Care Act	27 207 Establishing rules for achieving a new balance between work and care in the broadest sense (Work and Care Act), No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (04-07-2000)
Paid Parental Leave Act	35 613 Amendment of the Work and Care Act, the Flexible Working Act and any other laws related to the implementation of Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance for parents and informal carers and repealing Council Directive 2010/18/EU (OJEU 2019, L 188) (Paid Parental Leave Act), No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (28-10-2020)
Paid Parental Leave Act	Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance for parents and carers and repealing Council Directive 2010/18/EU	Official Journal of the European Union (12-07-2019)
Flexible Work Act	32 889 Bill proposed by members Van Gent and Van Hijum to amend the Working Hours Adjustment Act in order to promote flexible working, No. 3 EXPLANATORY STATEMENT	Chamber piece, House of Representatives of the States General (09-09-2011)

3.2.2 Collection of data on the barriers to the policy effectiveness

This section describes the method of collecting the data on the effectiveness of the Dutch WLB policies to the policy addressee by conducting a literature analysis for both grey and academic literature. Collecting and analysing these data can help identify the gap between the behavioural assumptions of the WLP policies and the actual performance of those policies in practice, leading to policy recommendations.

The grey literature will be collected from various sources to accommodate the variegated perspectives of the stakeholders in the WLB policy in the Netherlands. The sources include, for example, governmental departments, non-governmental organisations (NGOs), consultants, labour unions and public and social media. Since the research domain is the Netherlands, most data will consist of sources in Dutch. The search was conducted by combining the blocks of search terms with the policies, behavioural factors and stakeholders. The search work was done by the Google search engine in Dutch to find the non-academic literature produced and circulated in the Netherlands. The search terms used are listed in TABLE 6 Search terms used for document collection.

TABLE 6 SEARCH TERMS USED FOR DOCUMENT COLLECTION

Search block	Search terms	English translation
Policy	Werk-privé balans	Work-life balance
	Kinderbijslag	Child benefit
	Kinderopbvangtoeslag	Childcare allowance
	Kindgebonden budget	Child budget
	Ouderschapsverlof	Parental leave
	Geboorteverlof	Birth leave
	Partnerverlof	Partner leave
	Zwangerschapsverlof	Pregnancy leave
	Flexibel werkuur	Flexible work hour
Behavioural factors	Vermogen	Capacity
	Kans	Opportunity
	Motivatie	Motivation
	Reactie	Reaction/Response
	Belemmeringen	Barriers
	Beperkingen	Constraints
Stakeholder	Ouders/moeders/vaders	Parents/mothers/fathers
	Medewerkers/werkgevers	Employees/employers
	Vakbond	Labour union
	Overheid	Government
	Beleidsmakers	Policymakers

The search process yielded documents from various sources, from government departments and public organisations to research institutions and commercial blog articles. Most of them were reports to investigate the situation of childcare, fatherhood, motherhood, or work-life balance. The search results yielded numerous articles from HR consulting firms that give general advice to employers, collective labour agreements from various industry sectors and labour conditions of employers, which do not provide much information on the relationship between the WLB policies and the behavioural factors of policy addressee. Therefore, only the

expert reports, academic papers, news and blog articles that elucidate this relation in the narrative were included in the literature for analysis.

For academic literature, the same set of search terms in the English translation was used and the words 'Netherlands' or 'Dutch' were added at the end. The search job was done in academic literature databases, largely in the same manner as described in Chapter 2 for the literature review to establish the analytical framework. Academic articles tend to focus on work-life balance policies collectively, rather than dealing with them separately. In total, 11 grey literature documents and 7 academic journal articles were collected. The full list of documents collected for the literature analysis is summarised in TABLE 7.

TABLE 7 SUMMARY OF DOCUMENTS INCLUDED IN LITERATURE ANALYSIS

Author (year)	Addressed policy*	Subject	Source (institution/ journal/book)	Document type
Grey literature				
SER (2017)	LS	Parents in the Netherlands	Social and Economic Council (SER)	Governmental advisory report
SER (2018)	LS, FW	Employees in the Netherlands	Social and Economic Council (SER)	Parliamentary advisory report
Roeters and Bucx (2018)	BS, LS	Working parents in the Netherlands	The Netherlands Institute for Social Research (SCP)	Governmental advisory report
van Echtelt (2019)	FW	Employers in the Netherlands	The Netherlands Institute for Social Research (SCP)	Governmental advisory report
Harthoorn et al. (2019)	LS, FW	Working fathers in the Netherlands	Rutgers	Expert group report
Korvorst (2019)	LS, FW	Working fathers in the Netherlands	Statistics Netherlands (CBS)	Public report
Broeks et al. (2020)	LS	Parental rights advocacy group	RAND Corporation	Expert group report
Kremer et al. (2021)	LS, FW	Employees in the Netherlands	Scientific Council for Government Policy (WRR)	Governmental advisory report
van de Graaf (2022) and others	LS, FW	Working mothers in the Netherlands	How About Mom (Maternity support service)	Online blog articles
Vader Zoekt Verlof (2022b) and others	LS, FW	Working fathers in the Netherlands	Rutgers & Foundation for Concerned Fatherhood (VDRS)	Online interviews articles
ANP (2022)	LS	Working parents in the Netherlands	Business Insider Nederland	Online news article

TABLE 7 SUMMARY OF DOCUMENTS INCLUDED IN LITERATURE ANALYSIS (CONTINUED)

Author (year)	Addressed policy*	Subject	Source (institution/ journal/book)	Document type
Academic literature				
den Dulk and Peper (2007)	LS, FW	Working parents in the Netherlands	Sociologia, Problemas e Praticas	Academic paper
Peper et al. (2009)	LS, FW	Employees in the Dutch financial sector	Work, families and organisations in transition: European perspectives	Academic paper
Yerkes et al. (2010)	LS, FW	Working women with children in the UK and the Netherlands	Community	Academic paper
Wattis et al. (2013)	LS, FW	Working women with children in the UK	Community, Work & Family	Academic paper
den Dulk and Yerkes (2016)	LS, FW	Working parents in the Netherlands	Japanese Journal of Family Sociology	Academic paper
Fuller and Hirsh (2018)	FW	Working mothers in Canada	Work and Occupations	Academic paper
Simonse et al. (2022)	BS	Working parents with children in the Netherlands	SocArXiv	Academic paper

* BS stands for the benefit schemes, LS the leave schemes, and FW flexible work arrangements

3.3 Data analysis

3.3.1 Analysis of policy data

The documents collected from the governmental archive are processed by the qualitative coding (Elliott, 2018) process using the analytical framework from Section 2.2. For the coding of the documents, the elements of the COM-B framework and the types of policies are defined in detail to identify the relevant sentences from the documents and thus allocate the policy to the corresponding location in the framework.

To start the coding process, the concepts from the analytical framework should be defined to identify the sentences and paragraphs from the source relevant to the corresponding parts. These keywords would then become *a priori* codes (Elliott, 2018) to be used for the coding process. As the definitions of codes are defined, they are used to identify the parts of the documents related to the concepts that the documents establish the basis or hint at its intention. The process of marking the codes on the sources was performed on ATLAS.ti, a computer-assisted qualitative data analysis software (CAQDAS). The codes that were used for the policy analysis are summarised in TABLE 8.

TABLE 8 CONCEPTS DEFINITIONS AND KEYWORDS TO BE USED FOR CODING

Concepts (codes)	Definition	Keywords
*COM-B elements (**Michie et al., 2011**)*		
Capability – Physical	Capacity to engage in the (physical) activity concerned	Capacity, engage, activity
Capability – Psychological	Capacity to engage in the necessary thought processes - comprehension, reasoning etc.	Capacity, engage, comprehension, reasoning
Opportunity – Physical	Opportunity afforded by the (physical) environment	Opportunity, environment
Opportunity – Social	Opportunity afforded by the cultural milieu that dictates the way that we think about things (e.g., the words and concepts that make up our language)	Opportunity, cultural milieu, the way we think, word, concepts, language
Motivation – Automatic	Processes involving emotions and impulses that arise from associative learning and/or innate dispositions	Process, emotions, impulses, learning, disposition
Motivation – Reflective	Processes involving evaluations and plans	Process, evaluations, plans
*Types of policy (**Olejniczak et al., 2020**)*		
Equip	Providing means and opportunities for desirable behaviour	Providing, means, opportunities
Ban	Placing a restriction or introducing rules that force compliance or make specific options unavailable	Restriction, rules, force, compliance, options, unavailable
(Dis)incentivize	Providing either incentives (monetary, time, other resources) or disincentives for specific behaviour	Incentives, disincentives, monetary, time, resources
Inform	Providing compelling reasons (why to do it) and the right information (how to do it) to comply	Reasons, why, information, how
Nudge	Co-opting, aligning and using emotions, heuristics, and intuition without forbidding any options or significantly changing their economic incentives	Co-opting, aligning, emotions, heuristics, intuition
Boost	Empowering policy addressees with smart skills and decision-making tools and environments	Empowering, smart skills, decision-making tools, environments

The analytical framework from **TABLE 2** consists of two parts: the COM-B framework and the types of policies. The COM-B framework has three elements – capability, opportunity, and motivation – that could further be divided into six subcategories. The types of policies consist of five categories – equip, ban, (dis)incentivize, inform and nudge/boost. The definitions for these concepts come from Chapter 2, and the keywords to act as the codes are listed in Table 5. The synonyms of these keywords that infer from their context will also be referred to code the paragraphs by their definitions. As the analytical framework has two dimensions, i.e. the

COM-B framework and the types of policy, the source documents will be coded twice using the two different sets of concepts so that the policy that the document provides the basis can be located in the framework.

3.3.2 Analysis of data on the barriers to the policy effectiveness

As in the policy analysis, the literature analysis for identifying the constraints of policy effectiveness is also done in two dimensions: the COM-B framework and the factors that hinder parents from utilising the WLB policies. For the factors that keep parents from taking the WLB policies, the three categories proposed by den Dulk and Yerkes (2016) in Section 2.4 are used for the coding work. In the literature analysis process, the codes were identified while reading and grouped into three categories. The full list of codes used for the literature analysis is shown in TABLE 9 List of codes applied for literature analysis.

TABLE 9 LIST OF CODES APPLIED FOR LITERATURE ANALYSIS

Codes	Description
Individual factors	
Financial feasibility	Expected income reduction that makes employees refrain from taking WLB policies
Position in work	The difficulty of taking WLB policies because of hierarchical position at work
Marital status	The difficulty of taking WLB policies because of not having a partner
Educational level	The lack of information, knowledge or ability to take WLB policies due to low educational attainment
Migratory background	The difficulty in accessing information or handling administrative processes due to having a migratory background
Unsupportive partner	Partners unsupportive of taking WLB policies
Societal-cultural factors	
Cultural norm	Prevailing cultural norms in society, e.g. caregiving mother and breadwinning father, that keep employees from taking WLB policies
Career concern	Concern over promotion in work when taking WLB policies, by making them look less committed to work
Industry sector	Influence of workplace culture dominant in a certain industry sector that keeps employees from taking WLB policies
Presenteeism	The attendance culture that forces employees to be present at the workplace during normal working hours
Institutional factors	
Attitudes of employers	The attitudes of managers or employers that are unsupportive and discouraging to taking WLB policies
Type of work	The difficulty of taking WLB policies because of the inherent nature of work
Colleague pressure	Pressure from colleagues about workload when taking WLB policies
Inadequate policy design	The policy designed in a way to discourage the policy addressee from taking benefits of the policy as it intends
Administrative burden	The administrative procedure that is too complex or difficult for households to access the desired policy

The codes for the barrier factors are also matched to the COM-B factors as a paragraph is coded twice with the barrier factors and the COM-B factors according to the definitions given in TABLE 8. This would be conducive to identifying the policy gap by comparing it to the results of the policy analysis, facilitating the policy recommendations.

3.4 Interpretation of the analysis

The results of the data analysis are subject to interpretation to diagnose the discrepancy in the intentions of policy levers and the barriers felt by the policy addressee, which could eventually lead to the policy recommendations. The interpretation work will be done with the quantitative method of the systems analysis and its outcomes will pave the way to the conceptual agent-based model for the possible experimentation of the findings by future researchers.

3.4.1 Systems Analysis

The gaps identified in the data analysis could lead to policy recommendations. To draw the desirable policy recommendation, an adapted version of a system diagram (Enserink et al., 2010) will be established from the findings in the previous sections. A system diagram is built based on the known or inferred causal relationships between the factors working in the systems, available means, external factors and criteria to evaluate the effectiveness of the employed means as depicted in FIGURE 3. Therefore, it requires an established relationship between all these components in the system under scrutiny.

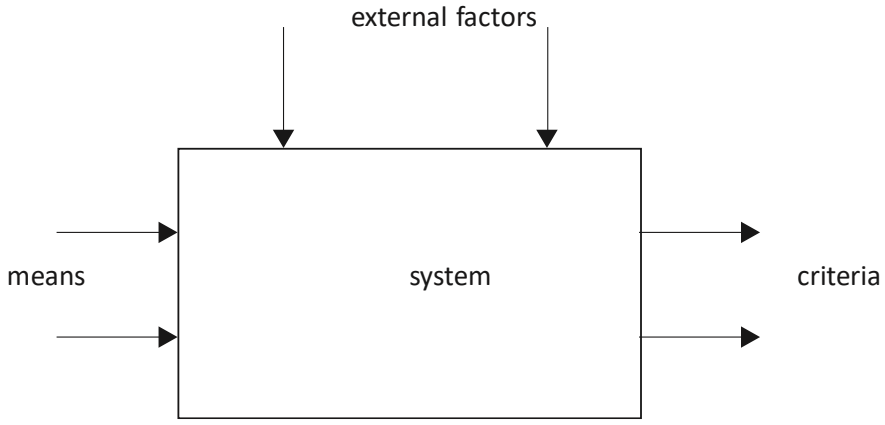


FIGURE 3 CONCEPTUAL DEPICTION OF A SYSTEM DIAGRAM (ENSERINK ET AL., 2010)

To apply this framework to this research, first, the behavioural levers, or the policy goals identified from the policy analysis, should work as criteria to evaluate the effectiveness of the new policies. Second, the barrier factors from the document analysis could become external factors. Third, the gap between the behavioural levers of the WLB policies and the barriers felt by the Dutch households could represent the focal system for the analysis. Therefore, the analytical framework with the COM-B framework and the types of policies establishes the boundary for the system as the policy arena where the COM-B elements and the types of policy measures take place. Then, the barrier factors are considered outside this framework but affect the way they lead to the policy outcome.

However, it should be noted that the relationship between the barrier factors and the COM-B framework components does not ensure causality, but only implies correlations. Thus, it could only be called an 'adapted' version of a system diagram without having established causal relationships. For the last step, the recommended policies should be put on the means available to the problem owner of the system, the Dutch government in this case.

3.4.2 Conceptual modelling

Following the result of the systems analysis with the policy recommendations, an agent-based model (ABM) of Dutch households is also conceptualised. The ABM method was chosen because of its potential for discovering emergent phenomena from the given set of behavioural rules of individual entities that interact with each other and with environments.

In the context of this study, Dutch households with children can be considered as a basic entity of the model, and by the external environment consisting of different kinds of WLB policies that affect their COM-B factors, i.e. capability, opportunity and motivation in using their resources for work and care duties. With the different combinations of the WLB policies and households with different needs of COM-B elements, it could potentially be used to find the policies that work best to fill the gap in COM-B elements of the households and lead to more balance in work and care, which then could finally lead to reduced household emissions.

The ABM method is usually involved in a part of the empirical research that researchers try to search for the quantitatively measurable outcome through computational experiments with a set of plausible scenarios (Epstein, 1999). However, considering the scope and time frame available for this research, it is reasonable to build only a conceptual version of the model that includes a set of model attributes, such as scenarios, variables, parameters, entities, processes, inputs and outcomes of the model. This conceptual version of the model is anticipated to help future researchers try to build a model with an appropriate tool, experiment with the scenarios and validate the results from it. In this research, the theoretical and empirical grounds for each of the model elements are extensively outlined using the findings from the case study as well as the relevant literature.

The conceptual modelling process was conducted following the ODD protocol (Grimm et al., 2020), the guideline used for describing the process of agent-based modelling. ODD stands for **o**verview, **d**esign concept and **d**etails. Since this research only seeks to explore the conceptual model that could be constructed from the result of qualitative research outlined in the previous sections, the modelling process will include only the *overview* and *design concept* parts of the protocol.

The results of the systems analysis are translated into the modelling elements using the XLRM framework (Kwakkel, 2017; Lempert et al., 2003), which stands for *e**x**ogenous/e**x**ternal uncertainties, policy **l**evers, relations in the system* and *performance **m**etrics*. The detailed process of overall conceptual model building is elaborated in Appendix**:** Conceptual modelling process.

4 Result of data analysis

In this chapter, the results from the policy document analysis and the interview are presented. Firstly, the result of the document analysis by the qualitative coding process is elaborated to establish the intention and underlying behavioural assumption of the policies when they were introduced. Then, the result of the interviews with the relevant stakeholders concerning their experience of the actual policy implementation is laid out. Finally, the result from these two parts is summarised in the matrix to map out the policy into the analytical framework to identify the gap between behavioural assumption and the outcome of the policies in practice.

4.1 Behavioural levers of the WLB policies

The result of the analysis of the policy documents with the qualitative coding process using ATLAS.ti is described in the following paragraphs. The results for each of the policy documents from Table 5 List of policy documents presented by the name of the corresponding law with the description of the policies covered by the law, purpose, target group, intended outcome and the underlying behaviour assumption and type of policy that are recognized by the coding scheme.

4.1.1 General Child Benefit Act – Child benefit

General Child Benefit Act (Algemene Kinderbijslagwet) is one of the oldest welfare policies in practice in the Netherlands. The first draft of this law was proposed in 1938 (Algemeen Handelsblad, 1938) and officially legislated in 1941 (SVB, 2020). According to Algemeen Handelsblad (1938), the law was introduced based on "the fact that the actual wage determination in our view does not take into account differences in the size of the family for the majority of wage earners." By introducing this law, the Dutch government aims "to provide a basis for a more equitable distribution of the total amount". When the law was first introduced, parents who have three or more children were entitled to the benefit. However, it was eventually revised in 1980 to cover all parents regardless the number of children (SVB, 2020).

As the scheme provides a financial subsidy to the wage earners to supplement the wage of employees who maintains a family with children, it seems clear that the type of policy could be called *incentivize*. Following the definition from Table 6, by giving financial incentives to the wage earners, the government wants to encourage people to fulfil their duty in both work and family life, even though this was not described explicitly in the article itself. It could be, thus, assumed that if wage-earners feel their income is not enough to maintain the size of their family, they may feel urged to work a second job to meet the financial demand of their family, neglecting the duty to care for their family.

The COM-B factor of this policy could be considered as a *social opportunity* from the following statement in the news article: "... by making it mandatory that when determining the wages of those whose families exceed the actual average size, *the associated greater burdens are taken into account*." (emphasis added) According to the definition from Table 6, the institutional environment that the government creates by introducing this policy could open a new opportunity for wage earners to care for their families with a reduced financial burden.

It should be noted that when a law is part of the *social* mechanism, the *social opportunity* meant by the COM-B framework is a *cultural milieu* that is the intangible influence that affects the way people think and talk, rather than the social institutions that dictate the way people should behave in a certain way. Therefore, the social opportunity created by the child benefit policy means the chance that makes employees think they need not work overtime or get another job to support their family, afforded by the financial incentive from the government.

4.1.2 Childcare Act – Childcare allowance

Childcare Act is the law that "establish[es] a legal entitlement to allowances for the cost of childcare for parents and other carers" (Tweede Kamer, 2002). The aim of this law is "to facilitate the combination of work and care and to increase the accessibility of childcare." (Tweede Kamer, 2002) As the allowance is means-tested, the amount that parents and carers can receive reduces as their income increases. Hence, unlike general child benefits, the government targets help specifically parents in the mid and low-income groups. By introducing this law, the government expects to "promote labour participation" of women especially, and also "the position of parents [to be] also strengthened by the introduction of demand financing." (Tweede Kamer, 2002) By the demand financing, the parliamentary paper means that "parents are given more freedom of choice and parents are the contract partners of the childcare institutions", which, in turn, can guarantee the quality of childcare.

Similarly to child benefits, childcare allowance can also be regarded as an *incentivize* type of policy, as the policy presents an incentive for the parents to participate in the labour market and guarantee the quality of childcare. At the same time, the policy has also the character of an *equip* policy, as it aims to strengthen the position of parents by *equipping* them with demand financing, i.e. more freedom of choice in childcare services. From this perspective, the COM-B factors could also become *physical capability* and *social opportunity* for the former and latter types of policies, respectively. With the *financial incentive* for labour participation and quality childcare, the government creates the *social opportunity* to steer the mindset of Dutch parents to opt to be working parents instead of homemakers. By equipping them with demand financing, parents get the *physical (financial) capability* to choose a good childcare facility in a stronger position.

4.1.3 Child Budget Act – Child budget

The Child Budget Act has a somewhat complicated history. In 2008, another sort of Child Benefit[7] Act (*Kindertoeslagwet*; compare to *Algemene Kinderbijslagwet*[8], the General Child

[7] The word *child benefit* used in this section means *kindertoeslagwet* that preceded the Child Budget Act, *Wet op het kindgebonden budget*.

Benefit Act described above.) was introduced to replace the existing child-related tax credit scheme to reach out to low-income parents, especially single parents and single earners with an income at the level of the statutory minimum wage (Tweede Kamer, 2006). The parliamentary paper explains that the tax credit scheme was relinquished because it has the problem that the minimum wage earners could not get enough benefit from the policy as they already paid little tax. It may seem like a very similar policy to child benefits, but the important difference between this policy and general child benefits was that "the [child benefit], just like the child tax credit, provides an *allowance per household* and that the [general] child benefit, like the child tax credit, is *based on financial capacity*." (emphasis added) (Tweede Kamer, 2006)

In 2009, just a year later after this law was implemented, the law changed its name to Child Budget Act (Wet op het kindgebonden budget, literally 'law on the child-related budget') and the School Expenses Allowances Act was integrated into this law to reduce the administrative burden of parents by going to "one counter" and cover more households who might have missed applying for one of the benefits (Tweede Kamer, 2008). This policy is, thus, intended for the same target group as the other child-related subsidies who can benefit from the integrated application procedure, as "they will automatically receive the advance child budget." (Tweede Kamer, 2008) In addition, the parliamentary paper explains that they can also receive an extra amount of budget by making school textbooks in secondary education free and integrating the School Expense Allowance Act into the Child Budget Act.

The type of policy, in this case, could include both *incentivize* and *nudge*, as the purpose of this policy is to provide both financial incentives "to prevent the level of income of parents from hindering the participation of their children in education" (Tweede Kamer, 2008) and automatic alignment of benefits application without imposing any further burden to the parents by "no longer have to submit a separate application to be eligible for an allowance for the school costs of their children." (Tweede Kamer, 2008)

Therefore, the corresponding COM-B factors for them could be *social opportunity* and *automatic motivation*, respectively. By providing financial incentives to the parents, the cultural environment that makes parents feel less burdened with educating their children is created. The effect of this aspect is especially notable in the Netherlands when compared to countries with highly competitive education environments, such as the United States or East Asian countries. And by definition, the *nudging* character of administrative integration automatically motivates parents to participate their children in the formal education system.

The law, however, does not mentions the aspect of the work and life balance of the parents as such. Nevertheless, as the child budget policy has considerable overlap with the previous child-related governmental benefits, it should also be regarded to help employees strike balance between labour participation and care needs.

[8] *Bijslag* and *toeslag* are synonyms in Dutch that both can be translated as *bonus*, *benefit* or *allowance* in English. They generally mean the genefit from the government.

4.1.4 Work and Care Act – Leave schemes

The Work and Care Act covers a range of leave schemes available to employees, which include maternity leave, paternity leave, pregnancy leave, partner leave, short-term care leave, adoption and foster care leave, and emergency and other short-term absenteeism leave. (Tweede Kamer, 2000) This law is the result of the development over several decades to combine multiple leave arrangements into a single scheme and address the agreement among the stakeholders concerning the labour arrangements, i.e. the government, municipalities, employers and labour unions. Parental leave, the backbone of these schemes, was introduced "to contribute to the redistribution of paid and unpaid work between women and men" (Tweede Kamer, 2000). Therefore, the target of this policy is women who could provide the labour force and stimulate economic growth through reduced amount of care duty or unpaid work. The goal of this law is to "make it easier to combine work and care and to promote that labour participation becomes more attractive than retirement for everyone", thus resulting in the outcome of "ensuring that, in addition to work, time is also left for tasks outside paid employment." (Tweede Kamer, 2000)

The position of this policy in the analytical framework could be assigned to multiple places. On the policy category axis, it can be located on *equip*, *ban* and *incentivize*. First, locating it on *equip* could be explained by multiple statements from the parliamentary paper that the law provides "time" to care for children and "more flexibility" in employment conditions to be agreed upon between employers and employees. (Tweede Kamer, 2000) This aspect is repeatedly emphasized in multiple parts of the parliamentary paper in explaining the importance and background of implementing various leave schemes. Since *equipping* employees with more time and flexibility in their work means that employees are subject to a new environment in which they can use these schemes directly through an administrative process, this could be considered a *physical opportunity*, unlike child-related subsidy policies.

Second, calling it a *banning* type of policy can be explained by the fact that the law makes it compulsory to use the "unconditional" and "statutory right" of using these leave schemes. In addition, some policies, such as parental leave, also prohibit the relegation of the leave days to partners. This compulsive nature of the law can also create a *physical opportunity* for employees for the same reason as the one described above.

Lastly, the *incentivize* type could be attributed to the policy ensuring paying 70% of the wage during the leave period. By paying the financial incentive, the government wants to *motivate* parents to remain in the workforce rather than retire early and focus on care duties. It could be a *reflective* process for parents, making them weigh the trade-off between focusing on childcare and continuing work. Therefore, this makes the policy identified as *reflective motivation* in the COM-B framework.

4.1.5 Paid Parental Leave Act – Paid parental leave

Paid Parental Leave Act, implemented in 2021, is the latest WLB policy in the Netherlands. The policy was introduced to ratify Directive (EU) 2019/1158 of the European Parliament (Tweede Kamer, 2020), which requires its member states to ensure work and life balance for parents and carers. With this directive, the EU "aims to help achieve policies on work-life balance and

equal treatment between women and men by promoting women's participation in the labour market and the gender gap in earnings and take away wages." (Tweede Kamer, 2020) Hence, this policy has largely the same target group and goal as the Work and Care Act which is already practised in the Netherlands.

However, the law was added to the scheme to ensure that employees who take parental leave get paid during the leave period, a significant difference from the Work and Care Act. Besides, the law also requires employers to ensure flexible working arrangements, which means the possibility to request flexible working arrangements for care purposes (Tweede Kamer, 2020). This eventually led to an amendment of the Work and Care Act and Flexible Work Act to meet the more extensive requirements set by the EU Directive.

The Directive (EU) 2019/1158, or work and life balance directive, succeeds Council Directive 2010/18/EU which required its member states to implement parental leave arrangements. As the EU found that the existing parental leave arrangements do not sufficiently promote work-life balance and equal treatment between men and women, the Union decided to update the directive. In the new directive, the non-transferable leave period from one parent to another was extended to two months from one. In addition, it became compulsory to pay benefits for the first two months of the leave period. By doing so, "the EU aims, in particular, to encourage fathers to take parental leave." (Tweede Kamer, 2020)

Since the EU Directive, and the Dutch law accordingly, was introduced particularly to address gender equality, it targets fathers to take more leave schemes and thus reintegrate mothers into the workforce after birth (Tweede Kamer, 2020). This is achieved by the compulsory payment of benefits during the leave period, which fits the definition of the *incentivize* policy type. In the COM-B perspective, this could be regarded as a reflective motivation, as the fathers are expected to consider taking paternity leave instead of working, drawn by the financial incentive of the leave schemes.

4.1.6 Flexible Work Act – Flexible working hours

The Flexible Work Act was implemented in 2011, substituting the Working Hours Act of 2000. Even though the Working Hours Adjustment Act already had measures to provide employees with the right to work in adjusted hours, the Flexible Work Act expand the right of employees to make both working hours and places adjustable (Tweede Kamer, 2011). By introducing this law, the legislators "want to effectively support the combination of work and private life." (Tweede Kamer, 2011)

Although the work arrangement is to be negotiated between employers and employees through the collective labour agreement, by giving "the right to request their employer to change [labour] hours, working hours and workplace", the government "wants to contribute to the culture change." (Tweede Kamer, 2011) From this point, the type of policy is recognized as *equip*, as it gives the right to employees for their better work and life balance, and the COM-B factor as a *social opportunity*, which is well represented by the phrase "social change" that the government wants to contribute.

4.1.7 Mapping of the policies onto the analytical framework

The result of the policy document analysis through qualitative coding elaborated so far in Sections 4.1.1 to 4.1.6 is summarized in **TABLE 10**. Notably, most of the policies included in the analysis fall under the *(dis)incentivize* and, to a lesser extent, *equip* types of policy. It shows that the Dutch government relies on policies that hand out financial incentives (*incentivize*) and grant rights (*equip*) to the citizens in addressing their work-life balance. It should be noted that, except for the leave schemes, the primary purpose of those policies included in the analysis is not work-life balance per se, but they nevertheless are relevant for the work-life balance of the citizens. This could be partly the reason why most policy types are concentrated on the *incentivize* type. In the following paragraphs, the locations of policies mapped onto the analytical framework are discussed in more detail. Discussions of *equip* and *(dis)incentivize*, the most frequently located policies, are laid out first and followed by the remaining policies.

TABLE 10 THE DUTCH WLB POLICIES MAPPED ONTO THE ANALYTICAL FRAMEWORK

COM-B Component		Policy category				
		Equip	Ban	(Dis) incentivize	Inform	Nudge / Boost
Capability	Physical	• Childcare allowance				
	Psychological					
Opportunity	Physical	• Leave schemes	• Leave schemes			
	Social	• Paid parental leave • Flexible work hours		• Childcare allowance • Child benefit • Child budget		
Motivation	Automatic					• Child budget
	Reflective			• Leave schemes • Paid parental leave		

4.1.7.1 *Equip* policies

The policies that are assigned to the *equip* type include leave schemes, childcare allowance and paid parental leave. They are labelled as *equip* because they aim to equip parents with something that was previously not available to them. For instance, leave schemes including paid parental leave give parents the "right" to demand a period of leave when the need of caring for their family arises and also receive 70% of their salary during this leave period. In a similar vein, the flexible work hours policy gives parents the "right" to work flexibly, either in temporal or spatial arrangements. In the case of childcare allowance, the policy intends to give

parents a “strengthened position” or “freedom of choice” in the childcare market by the means of demand financing.

Since the new equipment given to parents is not the *capability* inherent in parents but the new social circumstance that allows them to behave differently, they are labelled as a physical or social *opportunity* in the COM-B axis. Leave schemes are categorised as a *physical opportunity* because they are a set of administrative mechanisms that makes parents physically take the period of leave when care need arises. On the other hand, paid parental leave policy creates opportunities for the parents to dedicate more resources to care duties through financial incentives, hence grouped as a social opportunity. The flexible work hours policy works similarly to paid parental leave, albeit the means to create opportunity is the guarantee to work flexibly rather than a financial incentive. In the case of childcare allowance since the aim policy is to make the position of parents stronger in the childcare market by demand financing, it gives parents the financial capability to choose better childcare facilities. Since all of these policies involve financial measures, they also appear in the (dis)incentivize column in Table 10 The Dutch WLB policies mapped onto the analytical framework, except for the flexible work hours policy.

4.1.7.2 *(Dis)incentivize* policies

Five policies are assigned to the (dis)incentivize type: Childcare allowance, leave schemes, child benefit, child budget and paid parental leave. They are located on the (dis)incentivize column since they all give financial incentives to the parents in the form of either benefits for each of the children or salaries during the leave period. These policies are found in either *social opportunity* or *reflective motivation* among the COM-B elements. The policies grouped in *social opportunity* share the common nature of the direct benefit or subsidy to parents. This means that by giving *financial incentives* directly to the parents, they face a new *opportunity in their social milieu* that is generous or tolerant of prioritizing care duties over work. Otherwise, they might have had to work overtime or find a second job to make up for the extra cost to support their children. On the other hand, types of leave policies including paid parental leave and other leave schemes *motivate* parents, especially men, to take more time for their families. By doing so, the government wants to encourage economic participation and prevent the early retirement of women.

4.1.7.3 *Ban* and *Nudge* policies

There are only two policies that are under different categories: *ban* for leave schemes and *nudge* for child budget. The policy of leave schemes legislated by the Work and Care Act has partly the nature of *ban* policy, by prohibiting the transfer of leave period of more than two months to the other parent of the child, but it is not the central part of this policy. The child budget scheme also has both *incentivizing* and *nudging* character. In this case, *nudge* has a larger role as the policy was intended to reduce the administrative burden of parents by integrating the applications of several child-related benefits in one go. By doing so, the government makes parents apply for the child budget scheme automatically if they had already made the application for other benefits, without causing extra hassle for them.

4.1.7.4 Absence of *Inform* policies

Remarkably, there is no occurrence of the *inform* type of policy among the analysed policies. It is mentioned in the parliamentary paper for the Paid Parental Leave Act (Tweede Kamer, 2020) that the government has been trying other measures in addition to the leave schemes, among others, the campaign called "Have you already made it? (Dutch: Zijn jullie er al uit?)", to "make future parents aware of the choice they make around the birth of their first child about the division of work and care." (Tweede Kamer, 2020) However, unfortunately, there was little evidence of such a campaign available online, as the website (https://www.zijnjullieeraluit.nl/) and the Facebook page (https://www.facebook.com/zijnjullieeraluit) for the campaign were no longer in service.

4.1.7.5 Distribution of policies in the COM-B framework

In terms of the COM-B component of the analytical framework, most of the policies are supplementing *opportunities* for parents, either in a physical or social area. Meanwhile, the components of capability and motivation are found in just a few policies. Although Michie et al. (2011) proposed that the fiscal (financial) measures of the policy category are meant to support the *capability* of the policy addressee in the behaviour change wheel model, in the case of the Dutch WLB policies, financial measures are more likely to create a new *opportunity* for them to strike balance between work and life by creating the social environment that makes it easier for them to address the need for care from their work. Only in the childcare allowance policy, the support in *capability* is more explicitly expressed as, in choosing the quality childcare facility for their children, "the position of parents is also strengthened by the introduction of demand financing." (Tweede Kamer, 2002)

4.2 Barriers to taking the WLB policies

The literature analysis revealed the various barriers felt by the households when they try to take advantage of the WLB policies which are supposed to help them achieve the balance between work and care mainly through financial support and granting rights as found above. The grey and academic literature from **Table 7** were identified through the coding scheme using both the COM-B factors and the barriers found in the literature in **Table 9**.

The results are presented for each category of the barrier factors, i.e. individual factors, societal-cultural factors and institutional factors. To identify which policies are affected, the types of policies are grouped into three categories: *childcare benefit schemes*—child benefit, childcare allowance and child budget, *leave schemes*—paid parental leave and other leave schemes for parents, and *flexible work arrangements*—flexible work hours and telework/ working from home. For each of these barrier types, the COM-B elements are matched to identify the behavioural factors working on these barriers. After the barrier factors are identified, the gap between the behavioural levers analysed in Section 4.1 and the findings from this section will lead to policy recommendations and discussion on its implications for household carbon emissions. The summary of the literature analysis with the number of occurrences of each code is presented in **Table 11**.

TABLE 11 RESULT OF QUALITATIVE CODING FOR LITERATURE ANALYSIS

Category	Code ID	Code name	Affected policy	Associated COM-B factors	N	N total
Individual factors	IND_1	Financial feasibility	LS, FW	Physical capability	24	74
	IND_2	Position in work	LS, FW	Physical opportunity Reflective motivation	11	
	IND_3	Marital status	LS, FW	Physical capability	2	
	IND_4	Educational level	BS, FW	Psychological capability Physical opportunity	12	
	IND_5	Gender	LS, FW	Social opportunity	23	
	IND_6	Unsupportive partner	LS, FW	Physical opportunity	2	
Societal-cultural factors	SC_1	Cultural norm	LS, FW	Social opportunity	37	56
	SC_2	Career concern	LS, FW	Reflective motivation	8	
	SC_3	Industry sector	LS, FW	Social opportunity	7	
	SC_4	Presenteeism	LS, FW	Reflective motivation	4	
Institutional factors	INS_1	Attitudes of employers	LS, FW	Social opportunity	26	65
	INS_2	Type of work	LS, FW	Physical opportunity	5	
	INS_3	Colleague pressure	LS, FW	Social opportunity Reflective motivation	17	
	INS_4	Inadequate policy design	BS, LS, FW	Physical opportunity	14	
	INS_5	Administrative burden	BS	Physical opportunity	3	

* BS stands for the benefit schemes, LS the leave schemes, and FW flexible work arrangements

The result shows that the barrier factors are distributed across all three types of barriers, but some of them are recognised more frequently than others. It is also remarkable that the barriers to the leave schemes and flexible work arrangements are closely related, which reflects that the leave schemes and flexible work arrangements are often treated as the same package in the Dutch context. In the following paragraphs, these factors will be examined in more detail. The results are presented in chart format to allow more illustrative interpretation in FIGURE 4.

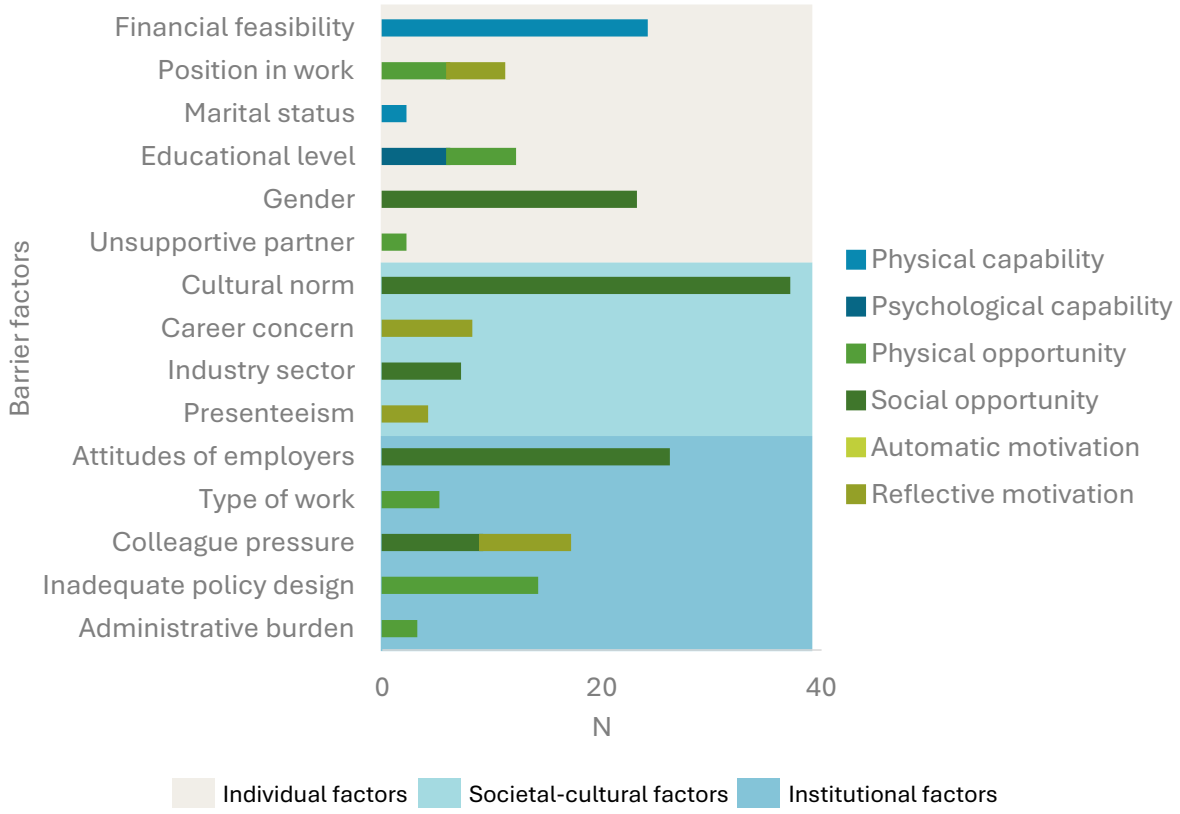


FIGURE 4 RESULT OF THE LITERATURE ANALYSIS

4.2.1 Individual factors

Individual factors are the most frequently observed within the included literature. Among these factors, the most prominent ones are *financial feasibility* and *gender*. Both of these barrier factors affect the taking of leave schemes, while *gender* also affects the flexible work arrangements. *Financial feasibility* by definition prevents the households to take WLB policies directly by limiting their *physical capability*. This factor is mentioned mostly to indicate the fact that the leave schemes in the Netherlands are unpaid or underpaid so that they are affordable only for those who are lucky enough to afford a period of income loss. *Gender*, on the other hand, is the factor that keeps parents from taking the WLB policies due to the lack of *social opportunities* open to both men and women. This is closely related to *cultural norms* in the societal-cultural factor. For example, the prevailing culture of the *ideal worker* who works 8 hours a day and 5 days a week and the *male breadwinner* gender norm makes Dutch fathers hesitant toward using leave schemes or flexible work arrangements. On the other hand, while the use of those schemes by mothers is generally viewed as desirable by the ideal of a 'caring mother', they also feel frustrated either by facing limited career prospects or by feeling too much pressure on juggling between work and care. This is discussed in more detail in the below section.

The barrier factors *position in work* and *educational level* are the next notable individual factors found in the literature. The factor *position in work* was used to designate both contractual positions of employees, i.e. temporary or permanent worker, or the hierarchical position in the workplace. The literature suggests that the workers on a temporary contract or in managerial

positions are more difficult to take leave schemes or flexible work arrangements. This is caused by the lack of *physical opportunity* due to either the limited access to these schemes for temporary workers or the high workload for managers. Meanwhile, the *educational level* has indirect effects on taking benefit schemes and flexible work arrangements. Parents who have lower educational attainment are disadvantaged in utilising these policies as they are unaware or unsure of their eligibility for the benefit schemes and they generally have the kind of jobs where flexibility is not available to employees.

Lastly, *marital status* and *unsupportive partner* are the barriers quoted in a few sources but are worth looking into. These factors both affect taking the leave schemes and flexible work arrangements through either *physical capability* or *physical opportunity*. The reports on marital status point out that many single parents are physically unable to take these policy measures as they have to maintain their children financially and thus cannot afford the reduced income. The employees who have an unsupportive partner in taking these schemes suffer from their opportunity to work-life balance physically blocked by their partners. The unsupportive attitude of partners also partly reflects the embedded cultural norm in society.

4.2.2 Societal-cultural factors

As already briefly discussed in the previous paragraphs, *cultural norms* are the most dominant barrier factor to the WLB policies among the societal-cultural factors. Despite the efforts of the government over the recent decades to promote equality in the labour market and a more balanced work-life in society, the concept of an ideal worker and the gendered norm of male breadwinner and caring mother is still widespread in the Netherlands according to the sources. This creates an unfavourable social environment for parents who wants to make use of the statutory rights for taking leaves and working flexibly, hence reducing the *social opportunity*.

Other barrier factors are closely related to or derived from this factor. In addition to the individual factors that were mentioned in the previous paragraph, other societal-cultural factors such as *career concern* and *presenteeism* are the products of this cultural environment. Both of these factors concern the negative consequence of using leave schemes and flexible work arrangements at the workplace. *Career concern* makes parents worry about their reduced chance of promotion when they look less committed and dedicated to work. Likewise, presenteeism, or the attendance culture, also makes parents feel the pressure to be always present at the workplace while they are squeezed in both work and care.

Lastly, the *industry sector* where parents work also matters when deciding to take leave schemes and flexible work arrangements. Literature suggests that in certain industry sectors using leave schemes and flexible work arrangements are uncommon and difficult to combine with company culture. This could also be a reflection of the widespread cultural norm of Dutch society which is difficult to change just by introducing the legislation to give employees access to the policy options.

4.2.3 Institutional factors

Institutional factors indicate the barrier factors that arise from the organisational context, such as the way parents have to deal with the friction within the organisation where they work or

where they have to face during the practical process. Most of these barrier factors come from the organisational context of the workplaces where parents work.

The attitude of employers and *pressure from colleagues* are two of the most mentioned barrier factors in both grey and academic literature. Parents who want to use their right to leave schemes and flexible work arrangements directly confronted the negative attitudes, from hesitant to hostile, of employers and managers. They were also indirectly frustrated by the contradictory environment where these policies are technically available but not encouraged to use. This works against the *social opportunity* for working parents to pursue more balanced work and life.

Likewise, colleague pressure also discourages parents from taking these policies through hostile and cynical attitudes of coworkers, limiting their *social opportunities*. However, another aspect of this barrier factor is that it makes parents consider the increased workload of their colleagues. They often become reluctant or give up to use the schemes as a result of *reflective motivation*. Meanwhile, the *type of work* that makes parents unable to use leave schemes and flexible work arrangements is also one of the barriers that are attributed to the workplace of parents. Some parents told the researchers that the nature of their work itself is not compatible with using the leave and flexible work schemes. This could be said that the opportunity to take these schemes is not physically open to certain types of occupations.

Other types of institutional factors are the ones that parents feel frustrated with as they go through the process of taking the WLB policies. The reports on *inadequate policy design* are found in all three policy types while *administrative burdens* are mentioned only with benefit schemes. There were various ways in which policies were inadequately designed. In the case of leave schemes, too short periods of leave were most often mentioned. In addition, the authors reprimanded that too short periods of paid leave make these schemes ineffectual. Flexible work arrangements were impeded by the absence of coordination in working hours between the policy, employers and social facilities such as childcare centres, nurseries and schools that make parents juggle work and care duties.

For the childcare benefit schemes, the eligibility criteria that require both parents should work turned out to be problematic because it makes vulnerable households unable to receive the benefits. Besides, the fragmentation of the benefit schemes also hinders access to these schemes by parents, making the policies ineffective. In the case of the benefit schemes, the barrier factor *administrative burden* appeared to have a greater role in making it difficult to apply for the benefit schemes, especially for socioeconomically vulnerable households with lower educational attainments.

4.3 Behavioural lever-policy barrier gap

To see how the barrier factors identified in the qualitative coding process match the COM-B components, these factors are mapped out to the COM-B framework for each of the policy categories. Comparing the barrier factors to the result of policy analysis from Section 4.1 could

reveal how the intention of policies is hindered by the barriers factors and therefore how the policies could be adapted to overcome these barriers. To see more clearly how barrier factors work on each of the policy schemes for each of the COM-B components, the barrier factors are mapped onto the COM-B framework for each of the policy types, i.e. benefit schemes, leave schemes and flexible work arrangements. By doing so, the behavioural levers of the policy schemes and their policy tools in practice could be more easily compared with the barrier factors identified above to see where the gap lies between behavioural levers and the barrier factors. The resulting locations of the barrier factors against the COM-B components are summarised in TABLE 12. The barrier factors are labelled with the affecting policies such as benefit schemes (B) and leave schemes and flexible work arrangements (LF). Since the leave schemes and flexible work arrangements have the same set of barriers as shown in TABLE 11, they are treated as a bundle in the following paragraphs.

TABLE 12 BARRIER FACTORS MATCHED AGAINST THE COM-B COMPONENTS

COM-B Component		Corresponding WLB policies from § 4.1.7	Barrier factors		
			Individual	Societal-cultural	Institutional
Capability	Physical	• Benefit schemes	• Marital status (LF)	• Type of work (LF)	
	Psycho-logical		• Educational level (B)		
Opportunity	Physical	• Leave schemes	• Position in work (LF) • Unsupportive partner (LF)		• Administrative burden (B) • Inadequate policy design (B, LF)
	Social	• Benefit schemes • Leave schemes • Flexible work	• Gender (LF)	• Cultural norm (LF) • Presenteeism (LF)	• Attitude of employers (LF) • Industry sector (LF)
Motivation	Auto-matic	• Benefit schemes			
	Reflec-tive	• Leave schemes	• Position in work (LF)	• Career concern (LF) • Presenteeism (LF)	

* (B): Benefit schemes, (LF): Leave schemes & Flexible work arrangements

4.3.1 Benefit schemes

The barrier factors of the benefit schemes are mapped onto the COM-B framework in TABLE 12 against the child-related benefit schemes analysed in Section 4.1, facilitating comparison with the policies in practice with corresponding policy types for each of the COM-B elements. Looking into the table, it stands out that the barrier factors pit against the policy goals in other areas of the COM-B components where policies were designed based.

Child-related benefit schemes are generally designed to achieve their goals by creating more social opportunities while supporting physical capability and encouraging automatic motivation. However, the barrier factors found in the previous section, namely *educational level*, *administrative burden* and *inadequate policy design*, work against these policies on psychological capability and physical opportunity, respectively. Here the gap is identified within the categories of the COM-B framework. While childcare allowance is meant to equip the physical (financial) capability of households, it is hindered by their psychological capability due to their low educational attainment. Likewise, the benefit schemes aim to create a social opportunity for the parents to fulfil their responsibilities in both work and care duties, but this intention is hindered by the lack of physical opportunity that facilitates this policy target in the administrative process. Therefore, to increase the effectiveness of child-related benefit schemes, policymakers should aim to tackle the barriers to *psychological capability* and *physical opportunity*. The literature provides valuable insight into how the Dutch benefit schemes face barriers in these areas, creating a gap between their goals and experiences.

In the Netherlands, the kinds of childcare benefits consist of three different schemes, as shown in Section 3.2.1. Though they were introduced for various reasons as learned in Section 4.1, they are ultimately to incentivize the parents by the means of a financial supplement. However, as there are different types of schemes for a similar purpose present at the same time, parents often feel the administrative burden or are even not sure of their eligibility for these schemes. For instance, Roeters and Bucx (2018) observed in their report 'Look at childcare – review' that the administrative burden and doubt over eligibility for childcare allowances are the principal cause of keeping parents, especially those in socio-economically vulnerable positions with low income and educational attainment, from applying for the benefit schemes. This is in line with the results of an empirical study by Simonse et al. (2022), pointing out that doubt over eligibility and fear of reclaim are the major psychological barriers to applying for childcare benefits.

Therefore, the barrier factor that can be identified here is the individual factor of *educational level* and the institutional factor of *administrative burden*. At the same time, the corresponding COM-B elements for the barrier to *educational level* could be the *psychological capability*, as the lack of income and education limits the capability of the parents to make the desired behaviour. For *administrative burden*, the barrier factor should be a *physical opportunity* as their opportunity to take advantage of these policies is physically deterred by their complicated process.

The doubts and concerns over their eligibility for the benefit schemes mainly stem from the fragmented nature of these schemes in the Netherland (SER, 2018). As found in Section 4.1, the three types of benefit schemes were introduced with different purposes. The child benefit based on General Child Benefit Act is to supplement the wage of employees who have to support a larger family by having children, thus proportional to income. Meanwhile, the childcare allowance and child budget are meant to ensure access to quality childcare for all households, especially economically vulnerable ones. Thus, they are means-tested subsidies, helping lower-income households and limiting the benefits to high-income parents. However, as there are many different kinds of benefit schemes, parents are often confused about their

eligibility for the schemes and frustrated by the complex administrative process and the fear of reclaiming if it turns out they are not eligible (Roeters & Bucx, 2018; Simonse et al., 2022), limiting the effect of the policy goal of improving childcare and work-life balance of parents. Moreover, as the amount of benefit is calculated based on the actual hours of work, the self-employed and freelancing workers whose work hours are not predictable over the year can face uncertainty when they apply for the benefits, risking repayment if they work less than they anticipated (den Dulk & Yerkes, 2016).

Therefore, it could be said that the policies are not achieving their goals due to the *inadequate design of the policy,* which is grouped as the institutional factors. Meanwhile, it could be said that *physical opportunity* plays a role here as the fragmented policy design makes access to the benefits less desirable in the physical process.

4.3.2 Leave schemes and flexible work arrangements

The gap between behavioural levers and barrier factors in leave schemes and flexible work arrangements are identified together in the same table as they have identical sets of barrier factors and corresponding COM-B components according to the results from **Table 11**. The barrier factors compared to the practised policies are summarised in **Table 12**. The policies included in the analysis are listed in the table against their corresponding COM-B components in the second column. It should be noted that the policies in this column appear multiple times as they are composed of a mixture of policy types.

It is noticeable that, unlike the barriers to the benefit schemes, most of the barrier factors to the leave schemes and flexible work arrangements are directly matched to their counterparts in the behavioural levers in the policy design, except for the factors of *marital status* and *type or work* in *physical capability*. This is because these policy schemes were by and large designed to encourage households to participate in economic activity while they have young children at home and accordingly to create an environment to help this in their practical steps. In other words, these policy schemes were not designed to supplement the capability at the individual level. The Dutch government facilitates this via financial means. However, it turns out that taking the leave schemes and flexible work arrangements were indeed hindered by the individual or societal-cultural situations that limit their capability to make use of these schemes, such as being a single parent who cannot afford reduced income due to alternative or reduced work hours that deviates with the regular working hours or having a job that is not compatible with such arrangements.

4.3.2.1 Leave schemes

According to the documents found in Section 3.2.2, it seems like leave schemes are the most widely discussed sort of WLB policies in academia as well as among the general public. Most of the reports on barriers to the WLB policies in the Netherlands were observed in taking leave schemes for both men and women. Various sources discuss this aspect, from academic articles and governmental reports to news and blog articles.

To begin with, as with the childcare benefit schemes, there are many different kinds of leave schemes available for employees, often confusing the parents with small children. This made the Dutch Social and Economic Council (SER) advise the government to simplify and integrate

the schemes to make the schemes achieve their intended goals (SER, 2018). Because of this complexity, one in nine employees use their vacation for care needs while they are still eligible for paid leave arrangements (Kremer et al., 2021). This could be attributed to the *inadequate policy design* among the barrier factors. Although Dutch parents are generally well-informed about the policy options available to them, the complexity of policy design makes it cannot reach its target, especially those less educated and less fluent in Dutch (Roeters & Bucx, 2018), making *educational level* and *migratory background* additional barrier factors.

Another example of *inadequate policy design* is a short period of leave which commentators criticize as a major flaw in the Dutch leave policies. Kremer et al. (2021) from the Netherlands Scientific Council for Government Policy point out that the Netherlands lags behind the other developed countries when it comes to parental leave schemes for informal care for new parents. They argue that the leave schemes in the country are not only unpaid but also too short to meet the care needs of employees while remaining in the workforce. Harthoorn et al. (2019) also rebuked that the Netherlands had "one of the worst leave arrangements for partners" among the European countries, urging longer paid leave schemes for better alignment of policy goals and needs of fathers.

The report from Statistics Netherlands collected the figures for leave schemes and flexible work arrangements by Dutch fathers with young children (Korvorst, 2019). While the report does not derive any argument from the observations, it suggests many barrier factors to those policies for Dutch fathers. According to the survey by Statistics Netherlands, the most frequently mentioned reasons for not taking the leave schemes are "1) no or too low compensation or financially unfeasible and 2) unfavourable for a career or cannot be combined with current work" (Korvorst, 2019). This can correspond to 1) *financial feasibility*, 2) *career concerns* and 3) the *type of work* listed in **TABLE 9**. In addition to this, they also found that the higher the educational level of fathers, the more they are likely to take the leaves, which could also be attributed to *educational level* among the barrier factors.

The findings of Statistics Netherlands can be confirmed by the research of academics and the government. For instance, den Dulk and Yerkes (2016) point out in their research on factors to combining work and family in the Netherlands that "the unpaid character of leave or a fear of career consequences when taking leave may form a barrier to the actual utilization of leave policies", citing the 2011 report from Statistics Netherlands (de Vries & van der Mooren, 2011). This suggests that there has not been much improvement in parental perception in the country even though there have been major changes in the leave schemes during the last decades, such as the introduction of paid parental leave and extended weeks of birth leaves (Broeks et al., 2020). Besides, unpaid leave schemes put single parents and low-income households in a particularly vulnerable position as they are often not affordable for a long period of leave without income (den Dulk & Peper, 2007; Wattis et al., 2013; Yerkes et al., 2010).

The pressure is not only felt on financial or career concerns but also directly by negative reactions from colleagues or managers. Wattis et al. (2013) report that some people were harassed by their colleagues and got phone calls from them when they were taking a day off. This kind of *unsupportive work environment* was also created by collective labour agreements

unfavourable to employee preferences in many organisations and reluctant or hostile *attitudes of managers* toward employees who want to make use of the statutory leave policies available to them (den Dulk & Peper, 2007). A *managerial position at work* also discourages managers themselves as they perceive it is hard to combine their work with leave schemes (den Dulk & Peper, 2007; Peper et al., 2009).

While individual and institutional factors play a major role in hindering the effectiveness of leave policies in the Netherlands, societal-cultural factors are also found. Harthoorn et al. (2019) noted that the use of birth leave by Dutch fathers immediately after birth remains low because it is either financially not feasible, their work does not allow it or their colleagues get overloaded. Besides, they also pointed out that the *cultural norm* of the "male breadwinner" ideal is still prevailing in society, making *employers or managers less understanding* of the need of male employees who put a priority on their family over work. The cultural norm also affects mothers by tacitly forcing them into the ideal of "caring mothers" (den Dulk & Yerkes, 2016; Yerkes et al., 2010).

Anecdotal accounts from Dutch mothers and fathers bolster these reports. An interview article from How About Mom, a maternity consulting service, introduces a story of a woman who decided to quit her job after returning from her maternity leave as the leave period is too short to recover from childbirth (van de Graaf, 2022). Yerkes et al. (2010) also conducted interviews with Dutch and British working mothers to study the disagreement between policy practices and lived experiences in combining work and life. In their study, answers from the interviewees were quoted to show how working mothers perceive the leave schemes through their own experiences, corroborating the various barrier factors identified above. For instance, a teacher told that she would have liked to use parental leave but she thought it was "unacceptable" as it turned out to be unpaid. (Yerkes et al., 2010)

It was not only working mothers who struggled to strike balance between work and life. Dutch fathers also share similar sentiments when it comes to taking leaves for care needs. For instance, the fatherhood advocacy website Vader Zoekt Verlof [Father seeks leave] had an interview with a father who works as a manager for a global alcoholic beverage group and told that the current Dutch leave period is not long enough and it is not common to use these schemes in the industry (Vader Zoekt Verlof, 2022a). Other interviews reports fathers saying that higher compensation during the leave period would have been nicer and that employers are not supportive of them when they try to make use of the schemes (Vader Zoekt Verlof, 2022b, 2022c).

In sum, the leave schemes in the Netherlands have many challenges to reconcile the intended goal of the policies and the needs of parents. The leave schemes are hindered by all three types of barriers. Individual factors, such as financial feasibility, gender, educational level, position in work and marital status could be considered that they limit the *capability* and *opportunity* of individuals and therefore discourage their *motivation* to take advantage of the leave schemes. To be more specific, the barriers like financial feasibility and marital status undermine the *physical capability* of parents to utilise the leave policies since their physical situation does not allow them to access these policies, leading to *reflective motivation* by

making them consider their physical situation before deciding (not) to use the schemes. On the other hand, the level of education can limit the psychological capability of parents as educational attainment itself does not physically conflict with taking the leave schemes but it makes these parents work in a less flexible work environment than highly educated ones, thus making their motivation automatically discouraged. Meanwhile, the position in work limits the *physical opportunity* to take the leave schemes by the nature of the work, also resulting in reflective motivation when they decide to use the schemes.

Societal-cultural factors, i.e. *cultural norms*, *career concerns* and *type of work*, can relate to *social opportunity* in the COM-B factor by definition. Institutional factors, including inadequate policy design and organisational contexts such as *colleague pressure*, *unsupportive employer* and *industry sector* affects *reflective motivation* as these factors discourage employees who want to take the leave schemes by making them consider the expected disadvantages.

4.3.2.2 Flexible work arrangements

The Netherlands is well-known for its part-time culture, attracting more women to participate in economic activities while still allowing them to dedicate a large part of their lives to family care. This resulted in a "one-and-a-half earner model" (den Dulk & Yerkes, 2016), a distinct feature of the Dutch family model which is distinguished from the dual-earner households in the other welfare states, notably the Nordic countries. The part-time culture that allows parents, especially mothers, to live in both the family and work spheres often makes the country to be praised as having "the best work-life balance in the world" (Smith, 2018).

However, the picture viewed from within the country is quite different from the outside world. Many Dutch experts and academics document an extensive amount of reports on how many negative experiences Dutch parents face when they try to use flexible work arrangements in their workplaces. The Dutch flexible work arrangements have similar shortcomings to the leave schemes but only to a greater degree. Researchers point out that one of the major setbacks to the Dutch flexible work schemes is the persistent *cultural norm* of the "ideal worker" who works a standard 40-hour work week and thus is present in the workplace when most other workers are there as well (den Dulk & Peper, 2007; den Dulk & Yerkes, 2016; Kremer et al., 2021; Roeters & Bucx, 2018; Wattis et al., 2013; Yerkes et al., 2010). This cultural norm extends to the gendered attitudes towards the employees, reflecting the pervasive ideal of "male breadwinner' and "caring mother". This affects not only male workers by discouraging them to take the flexible work arrangement itself but also female workers by expecting less commitment to work and thus fewer career prospects.

Most other barriers to flexible work arrangements stem from this cultural norm. The pressure from colleagues, either directly or indirectly, prevents parents from adjusting work hours. Many working parents in the Netherlands had to deal with negative reactions from their colleagues with either joking comments or even hostile attitudes. For instance, the State of Dutch Fathers report shows that gender-transformative work, i.e. breaking cultural norms around the gender roles in work and family care, is less likely to be shown by men because "it could be seen as feminine by friends or colleagues or because it could express weakness." (Harthoorn et al., 2019)

4.4 Policy recommendations

4.4.1 Representation of the policy gap using a system diagram

In the following paragraphs, the recommended policies using the system diagram method are sought for each of the policy sets with the policy gaps identified in Section 4.3. The system diagram for the current policies is drawn first, and then the recommended policies replace the current ones in the diagram by identifying the gap in the visualised form.

4.4.1.1 Recommended policies for benefit schemes

Following the steps for constructing a system diagram described in Section 3.4.1, the criteria for effective reach out of the current child-related benefit policies should be decided first. The major problem in achieving the policy goals for the benefit schemes was that the schemes were not reached by the target population, especially socioeconomically vulnerable ones and thus they can not afford childcare services. Therefore, the criteria for the childcare benefit schemes should be set as the access rate and the amount of benefit available to households with young children.[9] Then, the barrier factors are laid on the top panel of the diagram and the current policy measures are put on the left panel. Finally, the COM-B factors are located within the system boundary and connected to the policy measures and barrier factors with arrowed lines. The solid line coming from the policy measures indicates that they reinforce the connected COM-B factor to achieve the policy goal on the right panel. The types of policy from the analytical framework for each of the policy measures are labelled on solid lines. On the other hand, the barrier factors are connected to the COM-B factors with dashed lines to show that they undermine the connected COM-B factors, which inhibits achieving the desired policy outcomes. The system diagram constructed according to the above description is shown in FIGURE 5.

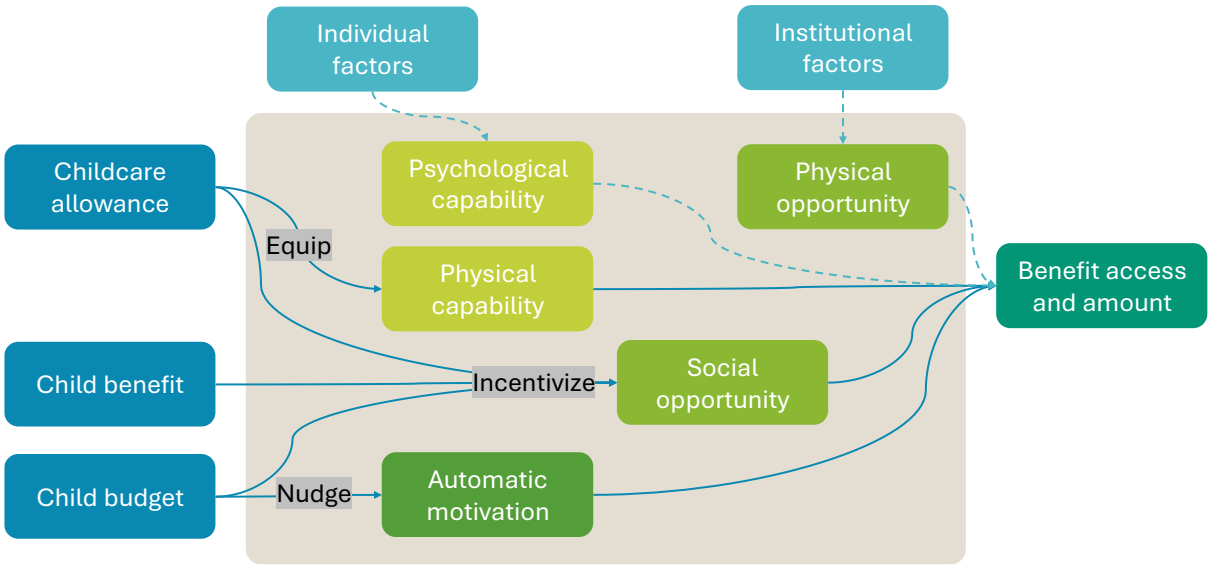


FIGURE 5 SYSTEM DIAGRAM FOR THE CURRENT BENEFIT SCHEMES

[9] Ideally, it should be formulated in a quantitatively measurable way to evaluate the effectiveness of the tested policies in reality.

From this figure, the gap between the policy measures and the barrier factors could be visually identified by checking which COM-B factors that undermine the effective policy outcomes are not addressed by the current policies, thus requiring remedial measures. It stands out that the benefit schemes try to ensure access to and enough amount of benefits by strengthening *physical capability*, creating *social opportunity* and inducing *automatic motivation* but these efforts are subverted by barrier factors that are caused by the limited *psychological capability* and *physical opportunity*. Therefore, remedial measures to make sure the effective take-up of the benefit schemes by those who need them the most should tackle these barriers.

To recall the barrier factors that work on the benefit schemes from **TABLE 12**, the factor that limits the *psychological capability* was the low *educational level* of vulnerable households. Therefore, a more targeted policy measure to specifically help these vulnerable groups get educated about their eligibility for the benefit schemes should be introduced. Among the types of policy measures that were discussed in Section 2.3, the *inform* type of policy suits best for this purpose as it can help augment the *psychological capability*. Besides, this can also create a more welcoming social environment for households with young children, thus reinforcing the *social opportunity* as well. An example of the possible policy that could be deployed for this is an educational campaign to teach new parents what kind of policies could be taken based on their situation and how to navigate through the administrative procedure to arrange the necessary steps for taking them. As briefly mentioned in Section 4.1.7.4, the current set of the Dutch WLB policies lacks the *inform* type of policies in their artillery and an information campaign called the campaign called “Have you already made it? (Dutch: Zijn jullie er al uit?)” was indeed tried but has never continued to gain a meaningful momentum to reach out to those who need the most. Therefore, a more committed campaign like this should be tried by the government.

Then, to tackle the barrier to the benefit schemes caused by institutional factors, such as *inadequate policy design* and *administrative burden*, it is recommended to have one integrated benefit schemes that would make the administrative procedure a lot simpler and easier for the parents. This way, the benefit schemes could *boost physical opportunity* by making it easier for the parents to deal with the complex administrative process, which fits the definition of *boost* policy that stimulates “System 2” thinking (Kahneman, 2011; Olejniczak et al., 2020).

With the recommended policies elaborated above, the system diagram drawn for the current benefit schemes could be modified to show how the new policies can help achieve the policy goals by addressing the barrier factors. A new system diagram that reflects this modification is presented in **FIGURE 6**. In this figure, the policy measures on the left panel are replaced with the recommended policies and hence the modified connections to the COM-B factors. The new connections are also made to the barrier factors with the recommended policy types in dark red. Finally, the connections from the barrier factors to the criteria on the right panel are also changed to solid lines to show that they are no longer undermining the policy outcomes and instead augmenting the effective take-out of the policies.

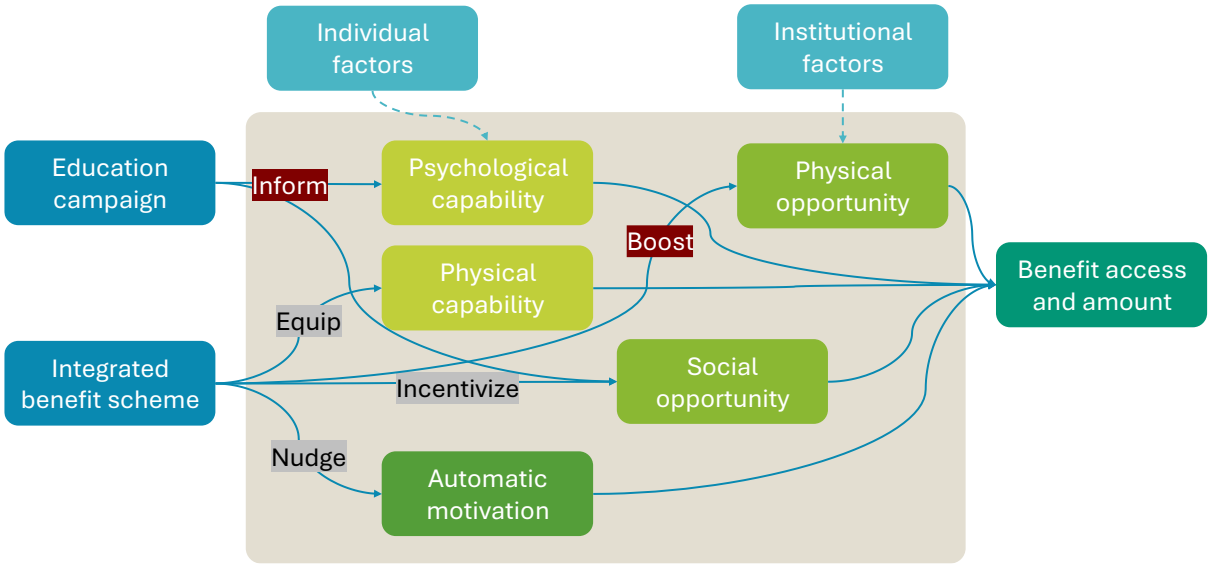


FIGURE 6 SYSTEM DIAGRAM FOR THE NEW BENEFIT SCHEMES WITH PROPOSED CHANGES

4.4.1.2 Recommended policies for leave schemes and flexible work arrangements

As with the benefit schemes, the system diagram for the current leave schemes and flexible work arrangements should be drawn first. Like the benefit schemes, the first criterion for the system diagram should be set as the access to these policies, since the barrier factors render access to these schemes problematic for the working parents. In addition to this, another criterion available in this case is compensation for the income loss, as the use of leave schemes and flexible work arrangements leads to somewhat reduced income for parents and thus the recent developments in the Dutch WLB policies include extending the paid period of leave schemes in pace with the work-life balance directive of the EU.

Then, the barrier factors are put on the top panel of the diagram and the current policy sets for leave schemes and flexible work arrangements are located on the left panel. Finally, the COM-B components are included in the system boundary and they are connected to the policy measures, barrier factors and policy criteria following the results from Section 4.3.2. The resulting system diagram is shown in FIGURE 7. It reveals that the current leave schemes and the flexible work arrangements in the Netherlands aim to achieve their policy goals through *physical* and *social opportunities* and *reflective motivation*. However, it turns out that not only these COM-B components are also undermined by all three categories of barrier factors but also an additional component of *physical capability* plays a role in harming the effective reach-out of these policies to working parents.

In this case, the gap between the behavioural levers of these policies and the barrier factors working against them are found in the *physical capability*. Besides, as all the other COM-B factors face the barrier factors in various ways, they also need to be tackled to make the existing policy measures more effective.

First, the barrier factors that inflict access to leave schemes and flexible work arrangements through *physical capability* come from individual and societal-cultural factors, i.e. *marital status* and *type of work*, respectively. Both of these barrier factors share the feature that the

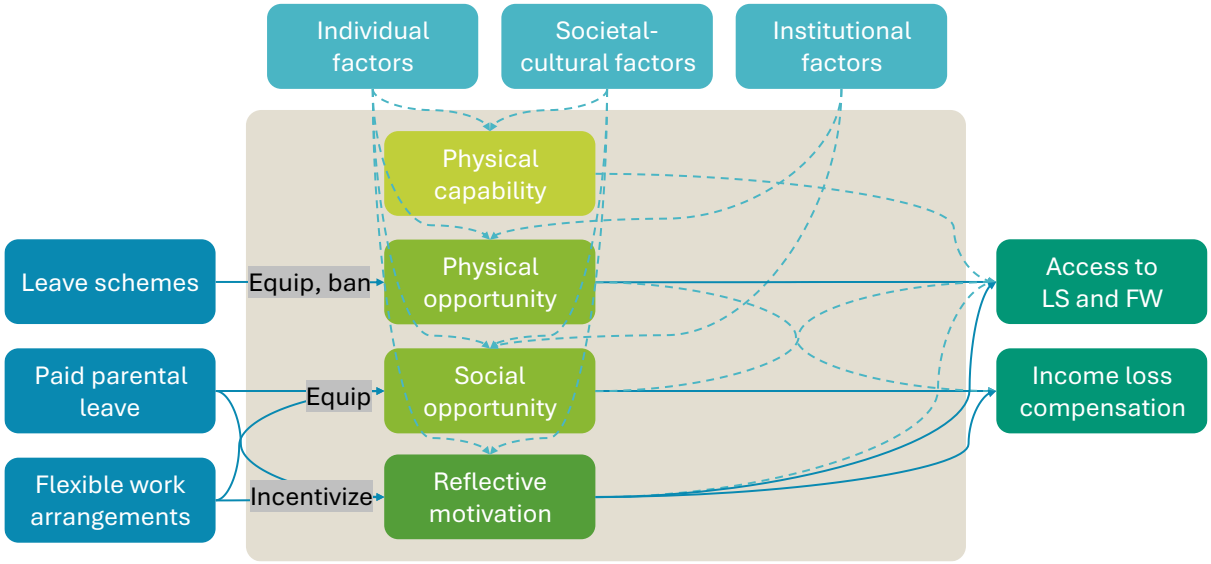


FIGURE 7 SYSTEM DIAGRAM FOR THE CURRENT BENEFIT SCHEMES AND FLEXIBLE WORK ARRANGEMENT

situation where the people find themselves either in the personal or occupational sphere renders them impossible to use these policy schemes. Thus, the type of policies that forces people to follow the rule, i.e. *ban* type of policy from the analytical framework, should be utilised to make the use of leave schemes and flexible work arrangements compulsory when the need arises, e.g. when an employee becomes pregnant or has a new child. This could sound far-fetched to some readers, but this kind of compulsory measure is already successfully implemented in some European countries like Sweden, Norway and recently Switzerland (Castro-García & Pazos-Moran, 2016; Rosenblum, 2020). Besides, this movement toward mandatory use of parental leave has also recently gained increasing support from academia, such as Bastani et al. (2016) and Sagmeister (2019).

Currently, the Dutch leave policies meet the minimum requirement of the non-transferable period of leaves which was recently set by the EU directive. Therefore, it could be proposed to make the condition for the transfer of leave period more strict as well as the period of mandatory leave longer. This mandatory requirement of using the leave schemes could also lead to a result of tackling the pervasive *cultural norms*, such as ideal worker, male breadwinner and caring mother, by making people more accustomed to these policies simply by seeing more employees making use of them. The weakened impact of *cultural norms* can lead to the amelioration of other barriers, such as disadvantages due to *gender*, the negative *attitude of employers* and *pressure from colleagues*. In that respect, the mandatory use of leave schemes could be considered to be the 'default' when people have a baby, hence endowing it with a character of *nudge* policy.

Second, the literature pointed out that the Dutch leave schemes are one of the shortest and least compensated among the developed countries and consequently many parents, including both mothers and fathers, had to negotiate either their career or family duties. Therefore, the leave schemes should be strengthened with a longer period of leave available to parents so that it can ensure that *social opportunities* to combine work and care are nurtured.

Third, as in benefit schemes, the leave schemes in the Netherlands are also criticized for their fragmented and complicated nature, leading to making employers unsure of whether they are eligible for using such schemes and making them use their vacation instead when in fact they are entitled to use other leave schemes. Therefore, it would be desirable to integrate the leave schemes available for employees into one comprehensive measure and inform the employers and employees of the entitlement, procedure and compensations of these schemes through an extensive information campaign and governmental engagement in the collective labour agreements. This would also create more physical and social opportunities as they can build a more welcoming environment for young families in both administrative and sociocultural spheres.

Lastly, it was often cited that income loss when employees use the leave schemes or flexible work hours is the major cause of inhibiting the use of those schemes, it is recommended that an increase in compensation of these schemes and also a longer period of payment during the leave schemes should beef up the current set of policy measures. In the case of flexible work arrangements, to make it truly 'flexible' instead of becoming a tool for part-time employment, the government should strive to expand the childcare services which are often considered too short and expensive by parents so that they do not have to sacrifice their income for childcare.

More fundamentally, the government would have to create a social environment where parents do not have to struggle to earn more income while they have to care for young children, hence making flexible working a more attractive option. This could entail measures to provide more affordable housing for young families, more comprehensive childcare services for toddlers or more subsidies to the childcare sector. Indeed, the Netherlands is one of the least spending countries in the EU on public welfare. However, as the discussion on these aspects goes beyond the scope of this system diagram, they are not to be included in it. The modified system diagram that reflects the recommended policy measures is depicted in FIGURE 8.

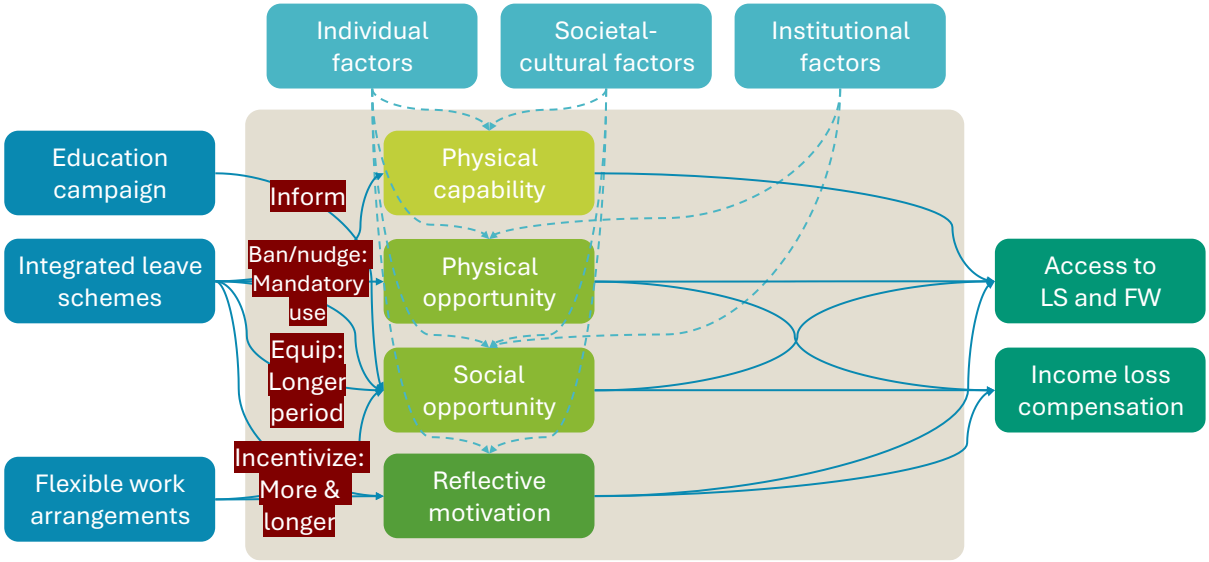
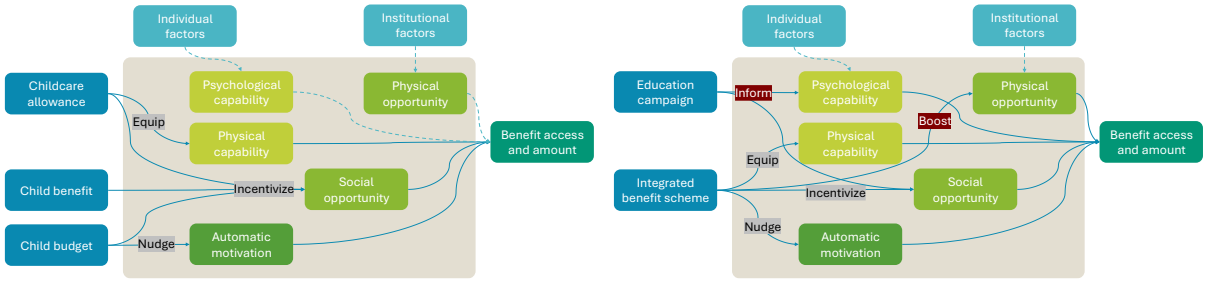
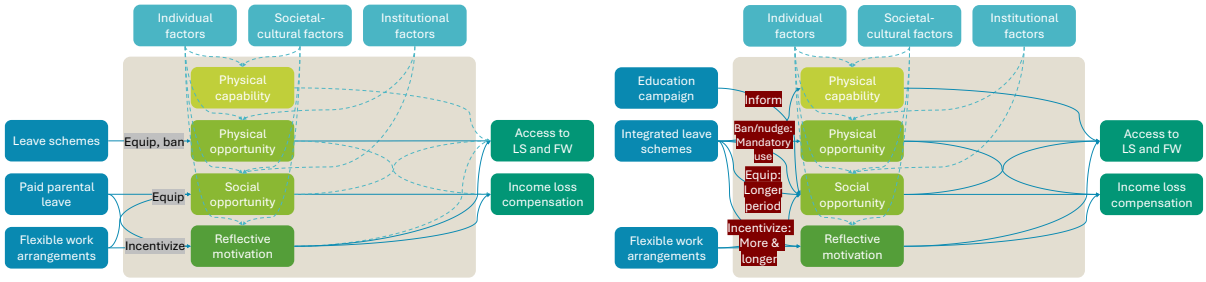


FIGURE 8 SYSTEM DIAGRAM FOR THE NEW LEAVE SCHEMES AND FLEXIBLE WORK ARRANGEMENTS WITH PROPOSED CHANGES

In summary, two policy recommendations for child-related benefit schemes and five for leave schemes and flexible work arrangements were proposed from the systems analysis. An overview of the changes in system diagrams for each of the policy areas is presented in FIGURE 9 for ease of comparison between the current and the proposed set of policies and their effects in the systems diagram.



(A) CURRENT (LEFT) AND PROPOSED (RIGHT) SET OF BENEFIT SCHEMES



(B) CURRENT (LEFT) AND PROPOSED (RIGHT) SET OF LEAVE SCHEMES AND FLEXIBLE WORK ARRANGEMENTS

FIGURE 9 OVERVIEW OF CHANGES TO THE SYSTEMS DIAGRAM FOR EACH OF THE POLICIES

According to the results of the systems analysis presented above, the recommended policies could therefore be summarised in three large streams:

- *Information campaign* for WLB policies to increase *psychological capability* and create a more *social opportunity*
- *Integration* of WLB policies to increase *physical capability* and create more *physical* and *social opportunities*, thus *automatically* or *reflectively motivating* working parents
- *Reinforcement* of current WLB policies to create more *physical* and *social opportunities*, thus *reflectively motivating* working parents

Implementation of these policy recommendations is anticipated to increase the take-up of these policies more effectively, hence resulting in a more number of households who can cope with their work and care duties in a balanced manner. While the original intention of these policies by the Dutch legislators is generally to encourage more economic participation of parents with young children, promote gender equality, ensure the quality of childcare and so forth, the focus of this study is rather different from those of the Dutch government—this study anticipates that the improved balance in work and life by the households with young children would lead to reduced household carbon emissions as the lack of balance between work and life could make parents feel crunched in time and thereby relying more on carbon-intensive

consumptions. This aspect of household carbon emissions to the recommended policies is discussed in Section 5.2.

4.4.2 Conceptual ABM from the research outcome

A conceptual model to test the recommended policies in the computational environment could be built from the result of the policy recommendations, also reflecting the implications of policy effectiveness on household emissions. This could be done by translating the system diagrams established in Section 4.4.1 as the thought process within the individual agents in the model. The elements in the system diagram such as COM-B components, barrier factors and policy measures act as the model variables. These model variables can form a relationship that makes the agents interact with the external factors, policy measures and also with each other. This could be embedded in a simulation model using the XLRM framework (Lempert et al., 2003).

To simulate household behaviour in a real world where they interact with each other, the behaviour rules when an interaction between them happens should be defined. Lastly, the policy recommendations are formulated as a set of scenarios to experiment with the model. Since the entire process of modelling is not in line with the focus of this research, they are included in the Appendix: Conceptual modelling process.

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5 Summary and discussion

5.1 Summary of the research findings

This research started from the doubt about why parents of small children who are supposed to bring up our future generations turn out to have a more emission-intensive lifestyle that would harm the environment where their children have to live. To solve this conundrum, the analytical framework of behavioural levers was introduced in Chapter 2, playing a central role in the research. From there, the main research question was established – How do the behavioural levers in the different types of policies targeting households with children influence greenhouse gas emissions?

In Chapter 3, the work-life balance policies in the Netherlands were decided as the research domain for the case study to find the answer to this research question as they specifically target households with young children and were found to have relevance to carbon emissions. The Netherlands was chosen as the country has high carbon emissions and is also known for its part-time culture and work-life balance of employees. Using the analytical framework of behavioural levers as the main clue, four research questions were composed to help answer the main research question within the delineated research domain. The data for the research was collected for the analysis of behavioural levers of the Dutch WLB policies and the barrier factors to them. The explanatory memorandum from the parliamentary archive was used for the policy analysis and the grey and academic literature concerning the experiences of stakeholders around WLB policies were collected for the barrier analysis. The collected documents were analysed with a systematic qualitative coding scheme. For policy analysis, the analytical framework was translated into the codes for the analysis. On the other hand, the codes were found within the literature during the literature analysis process.

Chapter 4 presented the answers to the research questions step by step. The first research question asked what behavioural levers are currently present in the work-life balance policies in the Netherlands. The second research question seeks to find out how work-life balance policies in the Netherlands aim to influence the behaviour of households with children. Section 4.1 answered both the first and second research questions by mapping out each of the policy measures onto the analytical framework composed of the COM-B components and policy categories. It was found that the child-related benefit schemes address physical capability, social opportunity and automatic motivation through equip, incentivize and nudge types of policies. The leave schemes aim to create physical and social opportunities and induce reflective motivation through *equip*, *ban* and *incentivize* policies. The flexible work arrangements only intend to promote social opportunity by *equip* policies.

In Section 4.2 and Section 4.3, the answer to the third research question – what factors inflict the behaviour of Dutch households with children when they utilise the work-life balance policies? – was found along with the corresponding COM-B components. It turned out that childcare benefit schemes are hindered by individual and institutional factors by undermining psychological capability and physical opportunity, respectively. Meanwhile, the leave schemes and flexible work arrangements are found to have identical sets of barrier factors working against them. These policy measures faced all three categories of barrier factors in the individual, societal-cultural and institutional realms. They undermined all of the COM-B components except for psychological capability and automatic reflection.

Lastly, Section 4.4 answered the fourth research question – which types of policy measures can better overcome the barriers for Dutch households with children to take work-life balance policies? It turned out that deploying more *inform*, *ban* and *boost* types of policies as well as reinforcing the current *equip* and *incentivize* types of policies would fill the gap between the policy intentions and barrier factors, hence policy recommendations.

The findings from the analysis enabled us to answer the main research question: How can the behavioural levers in the different types of work-life balance policies in the Netherlands help increase the effectiveness of policies? From the policy recommendations, it was found that informing the parents more about the WLB policies, integrating the multitude of current WLB policies and reinforcing the minimal provision of the current WLB policies are expected to aid the government to achieve its policy goals. Before concluding the study, however, it would be interesting and insightful to reflect on the implications of those recommendations on household emissions that gave original motivation for this research.

5.2 Implications of WLB policies on household emissions

Recalling the selection of research domain in Section 3.1.1, the reason why the work-life balance policies were selected as a subject for the case study was their relevance to carbon emissions of households from both empirical evidence and behavioural science perspectives.

Firstly, most of the empirical studies cited in Section 3.1.1 equated the work-life balance with reduced work hours. Their empirical findings mostly stem from the logic that reduced work leads to reduced income and consumption, thereby reducing emissions. However, the policy documents and literature for the analysis of barrier factors revealed that, in the Dutch WLB policy discourse, reduced hours of work are not necessarily considered ideal or desirable. The policymakers and researchers agreed that working parents need to reduce their working hours when they need to. However, by ‘combining’ work and life, they mean that these working parents also need to be able to return to work or dedicate enough amount of time to work as their need is fulfilled. This view is evident from the fact that the policy documents often mention that promoting more economic participation of parents with young children for sustainable economic growth is one of the primary reasons why they want to introduce these

policies. In short, the emphasis is on ‘work’ rather than ‘life’ when the legislators talk about work-life balance.

Besides, as the reduced income during the period of leave and flexible work was one of the major barriers that keep working parents from taking these schemes, increasing the amount of compensation was proposed as one of the policy recommendations. However, if the reduction in emissions is caused by reduced income and consumption, this policy recommendation is directly at odds with the goal of household emissions reduction. This is ironic as the measure to strengthen the effectiveness of policy is resulting in an unintended, undesirable outcome. Nevertheless, the majority of households that make use of these schemes currently indeed endure the loss of income during the period of leave or by working part-time. However, they only do so when their partner remains the main breadwinner in line with the ‘one and a half earner’ model of the Dutch household economy. Therefore, it could be concluded that the renowned part-time culture and work-life balance in the Netherlands are not compatible with the emissions reduction goal required to tackle the climate crisis as they are not meant to reduce work and consumption but to ensure more work and consumption. Thus the efforts to help achieve the WLB policy goals in the Netherlands would not bring about the reduced work and consumption anticipated by the researchers.

Secondly, the recommended policies could be reviewed from the perspective of behavioural science. As the behavioural science approach provides a different mechanism for the relation between work-life balance and household emissions, it could result in a more promising outcome that could make the policy recommendations helpful for reducing carbon emissions. From the behavioural science perspectives discussed in Section 3.1.1, the cognitive theories of dual processing and self-control both could help explain why parents who have an intention to adopt the pro-environmental lifestyle often fail to do so, experiencing the behaviour-attitude gap. For the working parents who have to juggle the responsibilities of work and childcare, a pro-environmental, low-emissions lifestyle costs them additional cognitive effort in which they have to be consciously engaged in virtually every aspect of their lives. This makes them choose an easier, more comfortable and more pleasurable lifestyle instead, which often comes in a form of mass-produced, carbon-intensive ‘packaged pleasures’ (Cross & Proctor, 2014). Therefore, it could be expected that ameliorating the hassle from the duties of work and care can create more room for engaging in pro-environmental behaviour in their life.

In light of this logic of behavioural science, the policy recommendations from Section 4.4.1 are found to be well aligned with reducing the hassle of everyday work and care. First, the integration of benefit schemes and leave schemes can simplify the administrative process when they want to take these schemes, reducing their cognitive burden, albeit this does not affect daily life. Second, information campaigns for the WLB policies can also relieve the psychological burden of parents as they do not have to go through the process of gathering the fragmented information by themselves. Third, the mandatory use of leave schemes removes the pressure from the employer and colleagues, also contributing to reducing stress. Last, the extended period of leave with the increased financial compensation during that period can make them worry less about childcare and financial matters. Consequently, parents could put

more effort to reduce their carbon footprint in their everyday lives thanks to the reduced psychological burden through the recommended policies.

In other words, ironically, the efforts to achieve the original policy intention could reduce the effect of emissions reduction as the ultimate goal of the government is to promote more economic participation of working parents to make sure sustainable economic growth, implying more income and consumption that is directly at odds with the goal of emissions reduction. However, when viewed from the behavioural science perspective, these recommendations can indeed help reduce the psychological and cognitive burden of parents of young children so that they can become more engaged in the pro-environmental lifestyle which requires quite a lot of conscious effort.

Therefore, the behavioural levers of the policies can influence the greenhouse gas emissions of households with children not by encouraging them to combine work and life in a sense that they participate in the job market more actively ultimately to earn and spend more, but by reducing the hassle of their everyday lives and thus providing more room for becoming more conscious and engaged citizens to tackle the impending climate crisis as responsible parents who take care of future generations.

5.3 Positioning of the research in the scientific community

The current research was initially inspired by the work of Nordström et al. (2020) who questioned the role of parents in mitigating climate change by reducing carbon emissions from households. Their recommendation for future researchers to look into the possible relationship between the policies that affect household emissions made this study focus on the WLB policies as they specifically target working parents with young children. From a methodological point of view, this study is also an empirical extension of the work of Olejniczak et al. (2020) who tried to establish the framework for the behavioural assumptions of the policy tools at a theoretical level.

This research shares a similar approach with a few other articles included in the literature review in Chapter 2. For example, Luo et al. (2021) and Stankuniene et al. (2020) looked at the barrier factors to adopting policy measures by its target audiences. This study is also in line with the works of Pape et al. (2011) and Wynes et al. (2018) as it strives to develop a new set of policies by analysing the status of the current ones. However, this research is distinguished by its novel combination of different perspectives on the carbon emissions of households with children and the work-life balance policies. While most research focuses on quantitative measures to evaluate the situation and propose remedies, this study combined the qualitative method of a case study and the quantitative method of a systems analysis as well as paved the way for future researchers to try a computational experiment through the ABM method to test the validity of the policy recommendations and other possible hypotheses.

Despite the uniqueness of the perspective of this research, the findings from the study are comparable to those of other researchers from various fields of study. For instance, many

researchers recently emphasized the need for the kinds of policies that reduce the efforts from the policy target rather than adding additional policy mechanisms that could feel like a 'hassle' for the policy addressee (de Vries et al., 2020). Indeed, the recommendations from this study try to reduce the burden on working parents by reducing the number of steps taken by the parents rather than adding another. As Adams et al. (2021) pointed out, this way of subtractive thinking is often overlooked by policymakers but could be much more effective in inducing behaviour changes.

This research is also in agreement with the group of academics in that it focuses on the role of work-life balance policies to catalyze the change to a more sustainable lifestyle (Brough et al., 2008; Chai et al., 2015; Melo et al., 2018; Pullinger, 2009), such as a transition to a low-emission lifestyle that is environmentally more sustainable and can be embedded in our children who will retain the lifestyle and value system they grew up with until the later stages of their lives. In that regard, this research is also in line with a broad stream of research that emphasizes the role of parents in the transgenerational effects of upbringing (Cripps, 2017; Hansen, 2018; Martens et al., 2004; Sanson et al., 2018; Torgler et al., 2008).

This research contributes to the scientific community with its unique approach to seeing the problem of the climate crisis from the perspectives of parents who are caught between the duties of raising future generations and turning the economic machinery. Selecting work-life balance as the primary research domain also enabled this research to contribute to social sciences by presenting a possible way to extend the coverage of policy analysis to cognitive science and environmental science.

However, this research also has many limitations. Firstly, the research used only secondary data by relying on literature analysis as the main method of data collection and analysis. As the research concerns the experience of parents with young children regarding the use of WLB policies, conducting interviews and/or focus group discussions with them would certainly have allowed for the collection of more recent, detailed and tailored data for this research. Although the Netherlands have a rich source of scientific research data as well as a well-maintained governmental archive, there were still many difficulties in spotting the right kind of information from the collected data. Thus, a future researcher might try to extend this research by having interviews and focus group discussions with parents and stakeholders.

Secondly, the findings of this research are confined to the specific research domain in the policy and geographic realm. Therefore, the policy recommendations from this research might not apply to other countries and regions or other types of policies, such as education, transportation or housing policies that also deeply affect the everyday lives of households with young children. Thus, it is recommended for future researchers to explore the approach of seeing the emissions problem from the perspective of childrearing in another region or country as well as for another policy area.

Thirdly, the modelling from the research findings was only done at the conceptual level, which could not be used for validation and verification of the research findings with computational experiments. Although the qualitative process already produced a convincing outcome, there

is still a possibility that experiments with well-defined scenarios could result in an unexpected divergence from the qualitative phase. Therefore, future researchers could try to build the agent-based model in a computational environment so that the research findings could be juxtaposed with the outcomes from the experiments.

Lastly, the processing of the data was solely conducted by a single researcher, which poses a greater chance of error in producing a consistent and reliable outcome. Although there were clearly defined coding schemes to qualitatively process the document data and a software tool that aided in the more systematic management of documents and codes, the sheer volume of texts to be analysed rendered the risk of inconsistent and inaccurate work. Indeed, it required multiple iterations to correct and modify the errors in coding to finalise the analysis with a certain degree of confidence. Therefore, it would be more desirable if the data processing could be done by multiple researchers who can review the works of each other and increase the quality as they proceed.

6 Conclusion

The research resulted in the policy recommendations in three main streams: informing more about the WLB policies, integrating a multitude of the current WLB policies and reinforcing the policy provisions such as use period and proportion of remuneration. In the context of the recent development in the political landscape in the Netherlands, these recommended policies mean changing the direction of the current Dutch government from austerity to more expansive government spending. Despite the reputation for good work-life balance and welfare system, the country lags far behind the government spending on welfare compared to other developed countries. After the Eurozone crisis a decade ago, the government drastically reduced those benefits and the country is ever since steadily heading towards the neo-liberal economic system by slowly disentangling the well-knit social security system. The diagnosis that led to the recommendations could come out from this background. Therefore, this study suggests the role of a bigger government by its policy recommendations.

The recommended policies also have implications for social equality in the country. Although the country is known for its equality and openness to a wide spectrum of the population, it turned out that people still face persistent cultural norms that discourage people from acting as they wish. Besides, the socially disadvantaged groups of people are structurally excluded by the current policy design. There have been struggles for improvement by advocacy groups for many years and they achieved some of their demands, but there are still many who suffer behind the blind spot of the government administration. The policy recommendations of this study are thus anticipated to help the government to reach out to more of those vulnerable groups and make society more open and inclusive for more people.

While the current study was inspired by the research on a parental role in household carbon emissions and gathered supporting evidence for acknowledging the positive effect of WLB policies in reducing household emissions, it took the approach of looking into the ways to improve the effectiveness of WLB policies rather than directly investigating the relationship between WLB policies and household carbon emissions. Therefore, it would be a meaningful endeavour to apply the analytical framework for WLB policies directly to find their impacts on household carbon emissions, desirably with primary data sources. It would be also interesting to extend the scope of the research domain to other parts of the world or other policy areas, which could enable us to see the findings of this research would also hold for another context. For example, it would be insightful to compare the WLB policies in countries with different political systems, historical backgrounds or economic sizes. It could also be interesting to see if other policies that affect the behaviour of households to a great extent, such as fuel tax or population control schemes could lead to similar policy implications, especially considering the scale of the collective impact caused by the behaviours of individual households.

The world today faces a multitude of crises stretching from environment and climate to food and agriculture, physical and mental health, housing and refugees, economics and finance, and geopolitical and class struggles at unprecedented scale and pace of development. While some commentators say that we need to talk about the adaptation to, rather than mitigation of, the societal collapse of this global civilization. Regardless of adaptation or mitigation, these crises are developing at breakneck speed, so our children inevitably become those who have to cope with a much more harsh and sinister world than ours. At the same time, despite the looming disintegration of our living system caused by driving the behemoth of the capitalist system, most of the parents responsible for raising future generations still have to plough through everyday lives with work and care duties, serving the system that drives collapse.

Even if the predicament imposed on our future generation by our own hands looks miserable and efforts to alleviate it might seem helpless, we still have the responsibility and chance to try to change the course of our current civilization. The change in workplace practices and lifestyle might be a tiny droplet in the ocean of tasks to save our world, but as the saying goes, little drops of water make a mighty ocean. Hopefully, this research add a small droplet to a tide of change in the way we live our lives and the way we shape our future.

Appendix: Conceptual modelling process

Based on the findings in the policy data analysis in Chapter 4, the conceptual model of the Dutch households where their COM-B needs are affected by the WLB policies with different types and COM-B factors is constructed. The conceptualisation process will be described following the guidelines of the ODD Protocol, which stands for **o**verview, **d**esign concept and **d**etails, for reporting the agent-based modelling process (Grimm et al., 2020). Since this research will only aim for conceptualisation for future research, the 'details' part of the ODD protocol, which concerns the execution method for simulation, such as the initialisation, input data and submodels, will not be addressed in this chapter.

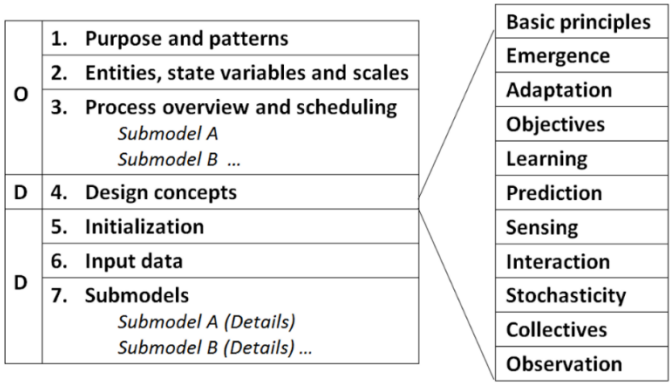

FIGURE A1 THE ODD PROTOCOL (GRIMM ET AL., 2020)

The conceptual model building consists of two phases. In the first phase, the model will be conceptualised by determining the key elements of the model. the purpose and patterns, i.e. the expected emergent outcome, of the model are outlined in Section A.1.1. Then, the entities, variables and scales, i.e. the measures to assess the model performance, to be used in the model are elaborated in detail in Section A.1.2. Lastly, in Section A.1.2, the process and scheduling method to be used for the interaction between the entities and environments are defined. In the second phase, the model is formalised in a way that could facilitate the computational experiment following the description. In Section A.2, the design concept is delineated with the time and spatial scale, behavioural rules of the agents and policy options for scenarios.

A.1 Overview

In this section, the model is conceptually defined by following the process of the ODD protocol. This includes defining the purpose and patterns of the model, delineating the entities, state

variables and scales to be included in the model, and outlining the process and scheduling of the model entities and variables. This step will pave the way for the formalisation of the model in a way that could facilitate computational experimentation.

A.1.1 Purpose and patterns

A.1.1.1 Purpose of the model

The primary purpose of the model should be to find the answer to the Research question: "How do the behavioural levers in the different types of policies targeting households with children influence greenhouse gas emissions?" To answer this question, the findings from Chapter 4 are used as guidance to build a model.

The entire conceptualisation phase is the process of striving to answer this question. The basis for conceptualising the behaviour of households with children in response to the WLB policies should be consulted from various sources, from the findings of the case study to both academic literature and grey literature. It should be kept in mind that the conceptualisation work should be done in such a way as to allow the ABM formalism to be consistent with the subsequent phase. This should be used to formulate plausible scenarios and policy options which can be experimented with by a computational method. Then, the result of this work should finally bring readers back to the main research question which will be answered by recapitulating the overall work done so far in the previous chapters.

A.1.1.2 Patterns to be discovered

The emerging patterns expected to be discovered could be outlined by revisiting the Research question and Sub-questions. The main research question focuses on the relation between greenhouse gas emissions and the behavioural levers of policies, households with children being the target of such policies. Therefore, the major pattern that this model aims to discover should be the relation between the behavioural levers of policies identified in Chapter 4 with the COM-B factors and the policy types, and the greenhouse gas emissions of households with children.

The sub-questions SQ2 and SQ3 also can provide the minor patterns that should be presented in the model. Sub-question SQ2 – "How do work-life balance policies aim to influence the behaviour of households with children?" – aims to reveal the way the WLB policies influence the behaviour of households with children in the Netherlands. This concerns the *types of policy* part from the analytical framework, which could be translated into the model as different tactics of each policy to try to influence the behaviour of households. The results from the policy analysis in Chapter 4 suggested that currently, the majority of the WLB policies in the Netherlands use the *incentivize* and *equip* types of policies. However, several types that might produce a better outcome could be tested under different scenarios in the model.

Sub-question SQ3 – "What factors undermine the behaviour of Dutch households with children when they utilise the work-life balance policies?" – also tries to search for the factors, i.e., the attributes of households and external parameters, that inhibit the behaviour of households from taking the WLB policies. From the analytical framework, it was hypothesized that the COM-B factors affect the way households behave against certain types of policy. In other

words, the effectiveness of the policy depends on how the policy could supplement the needs for COM-B factors in households. This relationship is an essential part of the research and thus must be included in the model to depict and discover the emergent patterns from it. The research questions and corresponding patterns are summarised in **TABLE A1**.

TABLE A1 RESEARCH QUESTIONS AND CORRESPONDING MODEL PATTERNS

Research question	Model pattern
Main research question – How can the behavioural levers in the different types of work-life balance policies in the Netherlands help increase the effectiveness of policies?	The relation between the behavioural assumptions of policies and the greenhouse gas emissions of households with children
SQ2 – How do work-life balance policies in the Netherlands aim to influence the behaviour of households with children?	The way the WLB policies influence the behaviour of households with children in the Netherlands
SQ3 – What factors keep households with children in the Netherlands from utilising the work-life balance policies?	The factors that keep households from taking the WLB policies

A.1.2 Entities, state variables and scales

In this section, the model elements that are needed for the experiment our outlined based on the results of the policy analysis and interviews. In addition to that, the groundwork for other variables, attributes and parameters used in the model is established by consulting the statistical, journalistic and academic sources to find the relevant relationships and figures from real-world examples and scholarly theories.

A.1.2.1 Entities

In this section, the entities that consist of the agent-based model are described by each type. There are two different entities in the model: the *agents* and the *environment*. The *agents* are the entity having specific inherent attributes and interacting with each other and the environment by the range of rules for the interactions. From these interactions, new phenomena could emerge through the experiment conducted over time. The *environment* is the one that comprises the external conditions of the agents in the model. They include the time unit, spatial boundary and external parameters that affect the agent in various ways.

A.1.2.1.1 Agents

Firstly, the agent of the model is defined as households. As the research concerns the behaviour of households with children against the WLB policies, households consisting of parents and children responding to the policies and interacting with each other as in a society should become a primary agent of the model. In setting households as a focal entity of the model, there is a consideration of whether a household should be treated as a single entity or as an entity consisting of sub-units of parents with different genders having unique characteristics and behaviours different from one another. Beal Cohen et al. (2021) showed that the model that addresses the intra-group dynamics better captures the reality full of interactions between and within agents. Interestingly, the study by these authors also

modelled the population dynamics with households as key agents as in this research and included intra-group dynamics between male and female household leaders. Thus, it would be desirable to have a gender dynamics element in the model to reflect reality more accurately.

As households become unit agents, other agents that interact with them in the model could also be considered. First, the government could be present in the model as a single entity that provides a range of policies that households can choose to adopt or not. With these policies, the government interacts with them financially, in the form of benefits and taxes. The government can also indirectly affect households with policies by imposing conditions for changing the collective labour agreement with employers which is another possible agent to include in the model. However, as there is only one government that regulates and enforces the policies in the model (and in the Netherlands), the government does not have to act as a stand-alone agent having policy measures as its variables but these measures can be simply treated as global variables.

Likewise, employers do not have to be modelled as separate agents from households and the government for several reasons. First of all, in reality, employers are not uniform and homogeneous entities which affect households in the same manner. Employers vary in many aspects, such as the salary level, work hours and WLB benefits package available. However, this could be modelled without including employers in the model directly, by making them attributes of households. This is, therefore, discussed further in Section A.1.2.2.

A.1.2.1.2 Environment

The first environmental entities to be defined are the time unit and temporal and spatial boundary. Firstly, it would be reasonable to decide the time unit of this model based on the time unit of the available data for model input, such as the level of income and expenditure of households, paid/unpaid work hours per household member, the level of greenhouse gas emissions per household, and so forth. Given that these data are generally available every two to five years, the time unit of a half year or a quarter would be enough to address the behaviour change of households incurred by the policies implemented by the government.

The spatial and temporal scope of the model can be decided by considering the scenarios for the experiment with the different policies and initial conditions. As the WLB policies are implemented at the national level in the Netherlands, the spatial boundary could be limited to the National border of the country. However, as the country has a population of more than 17 million and households of about 8 million (CBS, 2022), it is not plausible to build a simulation with the corresponding number of agents in the model space in terms of computational cost. Therefore, it would be more manageable to have a spatial boundary of a municipality or town with about thousands to tens of thousands of households.

When it comes to the temporal scale, considering the details of the WLB policies in the Netherlands, specifically the leave schemes that allow parents to use 16 weeks of leave before the child turns 8, the temporal scale of the model should be at least 8 years and given the various benefits related to children (child benefits, childcare allowance and child-related budget) are offered to parents until the children turn 18, the temporal scale should also span

over more than 18 years. And although there were on average 1.54 children per woman in the Netherlands, when counting only the married women, more than 65% of women have two or more children in the Netherlands (CBS, 2021). Thus, in theory, a household can receive the benefits for 28 years, if the age difference between the first and last child is, say, 10 years. Therefore, it would be desirable to have a temporal boundary of about 30 years to take into account the duration of benefits that can be offered to families with multiple children. Since the research and the model do not take into account the pension scheme, a time scale longer than 30 years, which means the average age of parents in a household almost reaches the retirement age, is not deemed necessary to be implemented in the model.

Other factors that can affect household behaviour, such as inflation or the trend in population increase, could be included in the model, as the model has the population growth throughout the given timeframe and also the income level and the amounts of benefits, which are state variables attributed to households discussed in the following section, will also follow the inflation of macroeconomics during that period. Other trends in population, such as the percentage of households with different income groups, different numbers of children, and/or different levels of greenhouse gas emissions could be reflected in the model to make the proportion of households with the abovementioned attributes change over time according to the relevant trends available with the projections in the future periods. The full list of entities in the model as discussed so far is presented in **TABLE A2**.

TABLE A2 LIST OF ENTITIES IN THE MODEL

Entity	Description
Agent	
Households	• Consists of parents and children responding to the policies and interacting with each other as in a society
Government	• Provides a range of policies that households can choose whether to adopt or not • Interacts with households via benefits and taxes • Indirectly affect households by changing labour environment
Environment	
Time unit	• Based on the time unit of the available data for model input • Quarter or a half year considering the time needed for the behaviour change of households incurred by the policies
Spatial scale	• A municipality or town with about thousands to tens of thousands of households
Temporal scale	• About 30 years, to take into account the duration of benefits that can be offered to families with multiple children

A.1.2.2 State variables

State variables are the variables that describe or represent the state of the agent at a specific moment during the model run. As our model deals with the households as the main agents that

interact with each other and with the environment and thus produce emergent patterns as described in Section A.1.1.2, most of the attributes to be described in this section belong to the household agent. The other main agent, the government, could also have the attributes to decide which policies to implement at a specific moment. There are also global variables that do not belong to the specific agent but can stand for the parameters of the environmental entities. The bases for these variables are defined in the below sections.

A.1.2.2.1 Household agents

As the main interactive agent in the model, households have many attributes to be expressed with the state variables. To begin with, households in the Netherlands are usually comprised of one or two parents either of the same or different genders and their children. Thus, the first state variable is *the number of parents* and *the number of children* in the household. These two are the basic feature of a household to be modelled but they are relevant for our model in several ways. First, they affect the amount of benefit they receive from the government. For example, the amount of child-related benefit schemes is determined by the number of children in a household. In addition, single-parent households can receive an extra amount. Second, household size has one of the greatest impacts on the level of greenhouse gas emissions from households. Considering the intra-group dynamics discussed in Section A.1.2.1.1, the number of parents should be *counted* from the sub-agents rather than just assigned.

The amount or level of income is another essential state variable of households. As *the number of children*, the *income level* also determines the amount of benefit that can be granted to a household. The child benefit policy is proportional to the income level of the parents because they were designed to supplement the wage of employees with children. By contrast, the childcare allowance and child budget schemes were introduced to support low-income households, so the amount of benefits is reverse-proportional to income and zero for those who have an income above a certain threshold. As in the household size variables, the income level has also a large impact on the level of greenhouse gas emissions or the carbon footprint of a household (Zen et al., 2021). The higher income of a household, the higher level of emissions. Many studies from various fields and regions confirmed that income level is indeed the biggest predictor of household carbon emissions (Christis et al., 2019; Goldstein et al., 2020; Weber & Matthews, 2008; Zen et al., 2021). Lastly, the income level is also the key factor in determining the work-life balance of households (Andersson et al., 2014; Jackson, 2005). These studies argued that the amount of work, thus the amount of income, should reduce to some extent so that households can take more time to care for their family.

The COM-B factors, i.e. capability, opportunity and motivation to change behaviour, for more work-life balance are another key attribute of the household agent. As established in the analytical framework, the behavioural levers of the WLB policies are supposed to supplement the COM-B elements for households to make them behave as the policymakers intended. While different policies can supplement different COM-B elements, parents in a household have different requirements of capability, opportunity or motivation to change their behaviour, as found in Section 4.2.

To make a better identification between people having different combinations of the COM-B factors, it could be interesting to create profiles of groups according to the pattern of different combinations. For example, a husband might have high motivation to participate in childcare and have enough skills and resources to be capable to do so, but he might lack opportunities to make use of them because of a social or physical hurdle from his work. As the household agent can have two sub-agents of parents within it, they might have different profiles of COM-B factors, which could lead to intra-household dynamics. There might be an interesting possibility to match these profiles to the other attributes, such as socioeconomic profiles or the type of industry they work in. However, it should require the research work in its own right, thus beyond the scope of this research. TABLE A3 demonstrates the possible list of COM-B profiles with different high and low levels of each element.

TABLE A3 AN EXAMPLE OF PROFILES WITH DIFFERENT COM-B LEVELS

Profile	COM-B factors		
	Capability	**Opportunity**	**Motivation**
Lacking motivation	High	High	Low
Lacking opportunity	High	Low	High
Lacking capability	Low	High	High
Lacking opportunity and motivation	High	Low	Low
Lacking capability and motivation	Low	High	Low
Lacking capability and opportunity	Low	Low	High

Other state variables that could belong to households include *total hours of paid/unpaid work*, *commuting time*, *different levels of conformity to social norms* and *level of household consumption or expenditure*. The state variable *total hours of paid and unpaid work* means respectively the number of hours worked in the workplace to earn income and the number of hours worked at home without being paid, usually for family care. This is one of the key indices to measure the level of work-life balance used by OECD (2020). In addition, this also defines the concept of a *time crunch* (Gimenez-Nadal & Sevilla-Sanz, 2011), which measures the level of work-life unbalance due to the high amount of unpaid work at home after the paid one. This is also called the *second shift* which most likely happens to single mothers (Gimenez-Nadal & Sevilla-Sanz, 2011). Druckman and Jackson (2016) suggested that the amount of paid and unpaid work is one of the main drivers of household carbon emissions by reducing the hours of discretionary time use, i.e. the time for leisure activities. In the same vein, the state variable *commuting time* should also affect the time crunch of households. While it does not belong to either paid or unpaid work, it could be considered the extension of paid work, thus less remaining time available at home.

The state variable *different levels of conformity to social norms* could play a significant role in describing the intra-household dynamics, as found in Section 4.2. As suggested multiple times in the parliamentary documents that give backgrounds behind the Dutch WLB laws, the major goal of the Dutch government in those policies is, among others, to create an environment to promote more gender equality by more equal distribution of paid and unpaid work between men and women. The reason why the Dutch government and the EU want to double down on this perspective is that there exists still a persistent social norm that discourages men to take more time in family care (EU, 2019; Tweede Kamer, 2000, 2020). In the meantime, the level of conformity to social norms could vary on a personal level. The former could relate to *social opportunity*, while the latter to *reflective motivation* in the COM-B framework, respectively.

The *background* of parents, including educational attainment, ethnicity and immigration status could play a significant role in affecting the way they interact with policies and with each other. Though these variables do not have a direct link to the WLB policies, they could be useful in determining COM-B profiles and conformity to social norms. In addition, they could be used to reflect the demographic trend in the Netherlands, which is governed by Global variables.

Lastly, the state variable *level of household consumption or expenditure* is not directly linked to the WLB policy itself but is relevant in determining household carbon emissions. If the area of consumption could be further identified in different groups such as transport, energy, food and goods, it can help create various profiles of households with different consumption habits, as demonstrated in the article by Time magazine (Semuels, 2022). As described in the article, this variable could result in significant variance in consumption levels between households. Therefore, this state variable should ideally be applied in a way to reflect reality as much as possible with the extra data gathered by surveys.

The state variables of the household agent described so far are shown in a diagram in **FIGURE A2**. In this diagram, the variables that belong to the household agent itself are shown in the outer box, while those that belong to the parent sub-agents are listed in the inner box. They were further grouped into three categories describing their characteristics: basic, time use and behavioural.

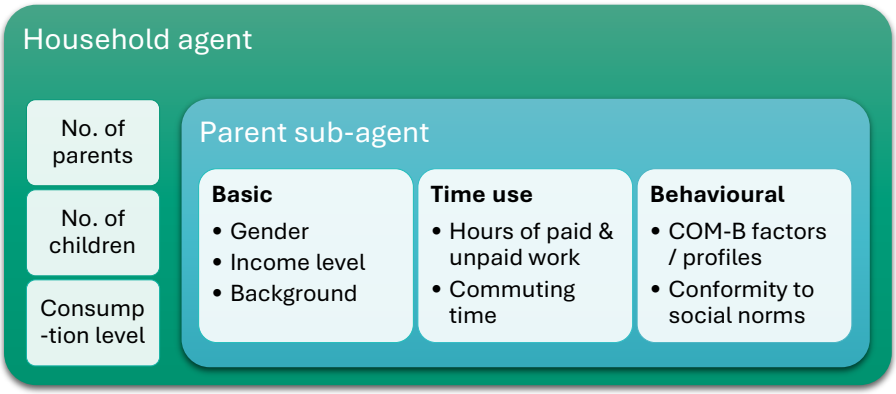

FIGURE A2 STATE VARIABLES OF THE HOUSEHOLD AGENT

A.1.2.2.2 Global variables

The state variables that do not belong to the local agents but the environmental entity become global variables that are used globally in the model. The policy measures that are implemented by the government are counted as global variables since the deployed policies will affect all the household agents globally. Besides, as the model will run on a relatively long time frame and features the economic and demographic elements, the state variables that could address the long-term uncertainties of the society should be also considered.

Firstly, the policy measures by the government affect the behaviour of households mostly by financial means, such as *benefits* and *taxes*. They can also affect the *hours of work* and *periods of leave* by making employers comply with the law when they make a collective labour agreement with the employees. Some employers might choose to provide better benefits to attract more competent talents, but the policy measures by the government ensure that the companies keep the minimum requirements when providing for those policies. As the government also is responsible for enforcing and monitoring the implementation of those policies, they can prevent households fall prey to exploitive employers who neglect these WLB policies.

To formalise the above roles of the government in the model, each of the WLB policies identified in Chapter 4.1 should be translated into the relevant global variables standing for the policy measures. For the *incentivize* policy types, the state variable *percentage of benefits* offered to households could be defined for each type of policy. For example, the general child benefit could be handed out in proportion to the income level of the household and, on the other hand, childcare allowance and child benefit could have disproportionate percentages of income. The details of the exact percentage for certain income groups should follow the figures from the policy documents. To facilitate the *equip* type of policy in the model, the model can have the global variables *minimum amounts of leave periods*, *the minimum percentage of salary paid during the leave* and the *hours of work in a week that can be used flexibly*.

By deploying these policies using the variables described above, the government can also supplement the COM-B needs of household agents. This could be implemented either by the score of each COM-B element that each of the policies can supplement or by defining the relation between the global variables of the government policies and the COM-B variable of the household agent. The policy variables described above are summarised in **FIGURE A3**.

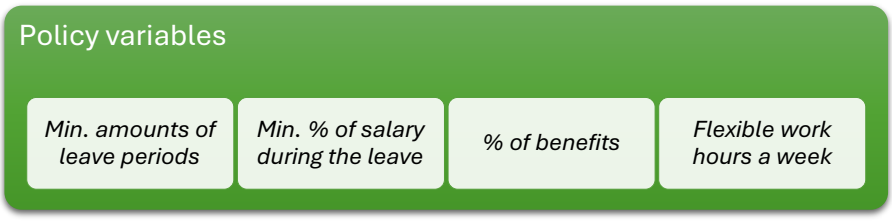

FIGURE A3 GLOBAL VARIABLES OF THE POLICY MEASURES

Then, the model also needs to have the variables to address the long-term economic and demographic change of the society as the model has a long time frame. *Inflation* should be included as the income and benefits should increase along with the inflation level, especially

considering the temporal scale of 30 years in the model as described in Section A.1.2.1.2. The child-related benefit schemes in the Netherlands have clauses that require reviewing the amount of benefit to reflect the price increase. Inflation also affects the level of household consumption by eroding the purchasing power of consumers (Floyd, 2022). Therefore, *inflation* as a global variable has many relations with other variables in the model.

Second, there should also be variables that could address the demographic change in society over time, such as *the number of households*, *the number of children per household* and *the birth rate*. As the model deals with the relatively long-term future scenario, the statistic forecast provided by the National Statistics Bureau (CBS), such as the share of households by type in **FIGURE A4**, could be used. By using these demographic trend variables, the model can regulate the change in population and household composition over time with a sound basis.

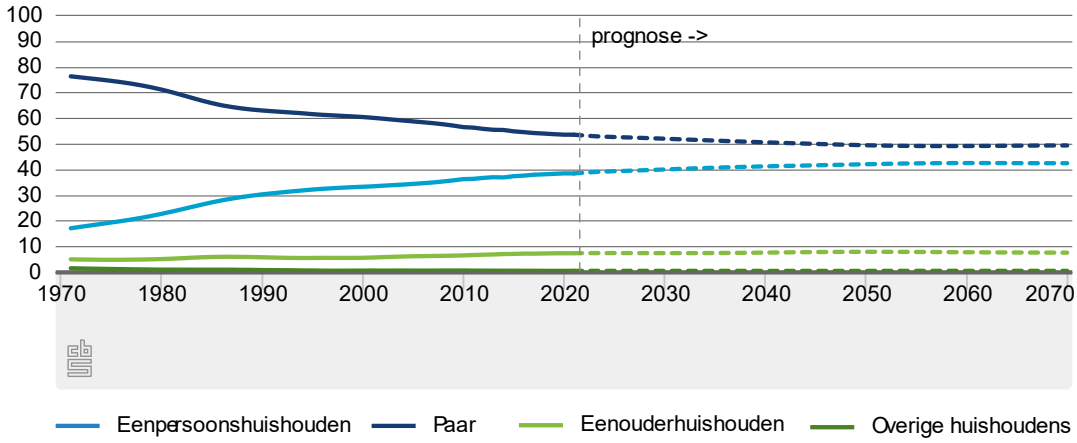

FIGURE A4 SHARE OF HOUSEHOLDS BY TYPE IN THE NETHERLANDS (STOELDRAIJER, 2021)[10]

The global variables described so far in this section can be called *policy **l**evers* and *e**x**ogenous uncertainties* according to the XLRM framework (Lempert et al., 2003) as depicted in **FIGURE A5**. The relationship between the model elements could be expressed clearly and the results could be analysed coherently using this framework. In the XLRM framework, the **r**elationship between the state variables defined above, which will be elaborated in Sections A.1.2.3 and A.2.1, is governed by policy levers and exogenous uncertainties. From these relationships, the outcome of the model is expressed with the performance **m**etrics, which are described in the following section.

[10] Eenpersoonhuishouden: Single-person households, Paar: Couple, Eenouderhuishouden: Single-parent households, Overige huishouden: Other households

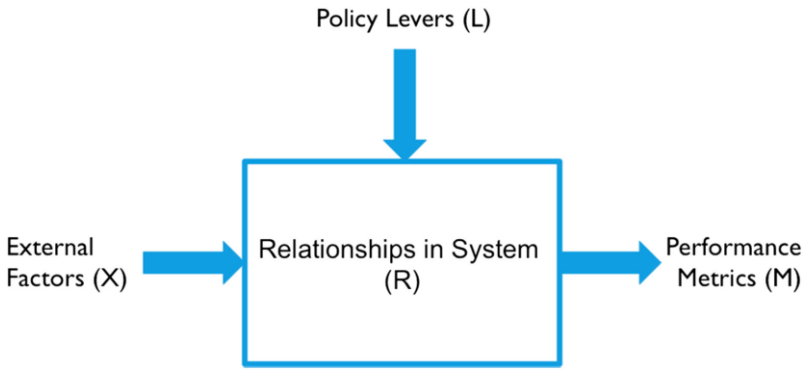

FIGURE A5 THE XLRM FRAMEWORK (LEMPERT ET AL., 2003). IMAGE ADAPTED FROM KWAKKEL (2017)

A.1.2.2.3 Scales

Scale in the ODD protocol means the metrics to measure the performance of the model. The performance of the model should be defined by considering the Purpose of the model and the research questions. The main research question seeks to find the effect of behavioural levers behind the different types of policies on the greenhouse gas emissions of households with children. Therefore, the key performance index (KPI) of this model should become *the total or average greenhouse gas emissions of households with children*. Measuring household emissions before and after the implementation of policies will enable policymakers to track the effectiveness of each of the policies grounded on certain behavioural levers. This could be calculated from the level of consumption using the existing tools widely used in the field.

However, as the work-life balance policies are the focal point to reducing household emissions in this research, the parameters that can track the overall status of the work-life balance of households should also be included, such as the *average level of the time crunch*, i.e. the ratio between paid and unpaid work. To measure the effectiveness of policies more directly, the *ratio of households who changed their behaviour* by the implemented policies could also be measured. By doing so, the reach-out rate of the policy could be calculated. Alternatively, the scale *subjective feeling of a time crunch or work-life balance* could be applied at the household level and then aggregated to measure the overall performance in the model.

A.1.2.3 Process and schedule

In this section, the process and schedule of the model are described to define the behaviour of the agents in terms of the time tick and time frame of the model. Since the model has the ABM formalism, all the agents in the model will simultaneously move at a tick. The movement of the agents is governed by the relationship between the agents and their relationship to the global variables. Therefore, to define the progress and schedule, the relationship between the variables should be defined first in a way to reflect the findings from policy and behaviour analysis in Chapter 4.

The number of parents is either one or two. To facilitate the intra-group gender dynamics discussed in Section A.1.2.1.1, the number of parents in a household could be represented by having different sub-agents within the household agent, like parent_1 and parent_2, and giving them attribute determining whether each of the parent sub-agent exists in the main household agent. If both parent_1 and parent_2 are present in a household, then the number of parents is

two. This way, the gender of both parents could be determined independently, representing households of same-sex parents in the model, which is not uncommon in the Netherlands.

Other variables that belong to each of the parents independently could be attributed in the same manner. However, the state variables that are shared by both parents belong to the main household agent. The former type of state variables includes amount/level of income, hours of paid/unpaid work, commuting time, level of conformity to the social norm and COM-B factors (i.e. capacity, opportunity and motivation to change their behaviour) for work-life balance and pro-environmental consumption. The relationship of the agents, state variables, scales and external factors are conceptually depicted following the formalism of the systems diagram from Section 4.4.1 in FIGURE A6.

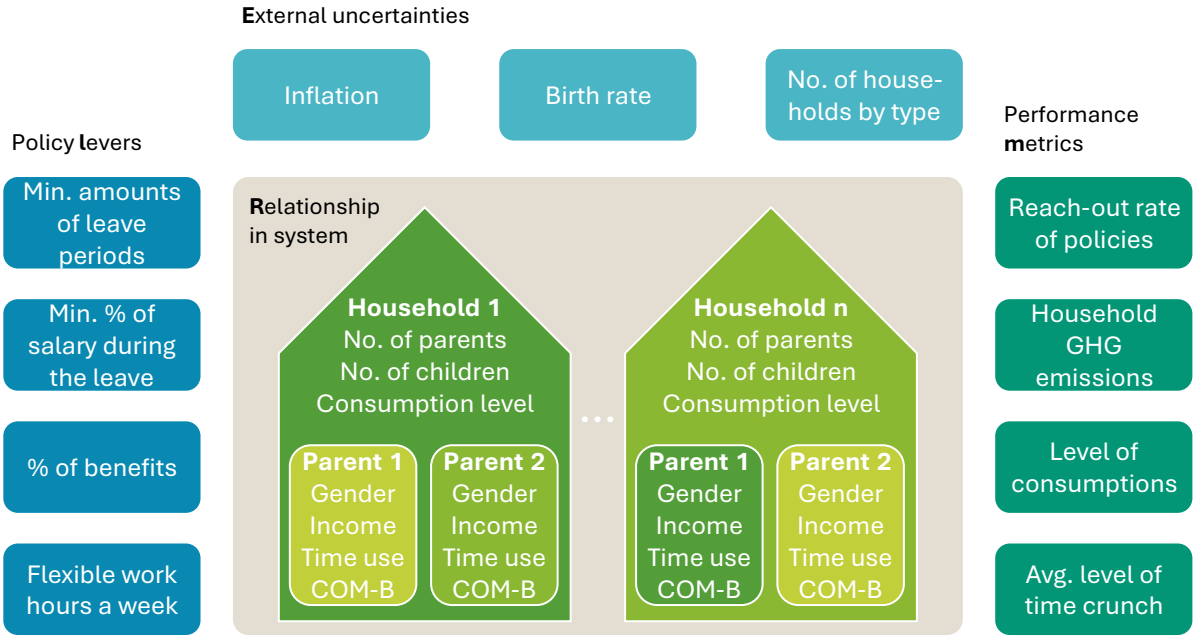

FIGURE A6 CONCEPTUAL REPRESENTATION OF A MODEL WITH THE XLRM FRAMEWORK

A.2 Design concept

A.2.1 Behaviour rules

Apart from the relationship between the entities, variables and scales delineated in Section A.1.2, the agents could have a set of behavioural rules that can be triggered when certain conditions are met. They could be the rules that are applied within the household agents but also between them. Below are some examples of these rules that could be applied within households. These are roughly based on the research findings as well as intuition based on common sense.

- The more households are time-crunched (i.e., too little time available after paid and unpaid work), the more they consume carbon-intensively.
- When household members feel too much pressure in time due to the failure to fulfil one of the COM-B factors, they might quit the job to focus on childcare and lose income.

- When the income of households falls too low below the poverty level, they might decide to work longer hours or have a second job to earn more.

As there are thousands of household agents located within the system boundary interacting with each other to simulate a small town or city, there should also be a set of rules for the interaction between them.

- Household agents (and individual sub-agents within them) form a group of a human network consisting of friends, neighbours and colleagues.
- The COM-B elements of household agents are influenced by the composition of other agents within their human network having different combinations of COM-B elements.

A.2.2 Policy options

The policy options can be tested with a set of policy options that are constructed from the policy recommendations in Section 4.4. These policy options affect In **TABLE A4**, the possible set of policy options with different combinations of recommended policies are listed with the corresponding COM-B factors that are affected by this option.

TABLE A4 LIST OF POLICY OPTIONS WITH AFFECTED COM-B FACTORS

Policy option	Description	Affected COM-B factors
Information campaign	The government launches information campaigns to raise awareness of and educate current and future parents about the WLB policies	Psychological capability Social opportunity
Mandatory leave	The use of parental leave becomes mandatory or default, so every parent should use it unless they voluntarily opt-out	Physical opportunity Social opportunity
Integrated schemes	Fragmented benefit schemes and leave schemes are integrated into a single scheme that could be applied through a single process	Physical capability Physical opportunity Social opportunity
Longer leave	The periods of leave schemes available to young parents are lengthened	Social opportunity
Increased compensation	The level of compensation when using the leave schemes increased and paid for a longer period	Reflective motivation

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