Sustainability **2015**, *7*, 7175-7194; doi:10.3390/su7067175

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Article

Workplace Waste Recycling Behaviour: A Meta-Analytical Review

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Academic Editor: Seonaidh McDonald

Received: 25 March 2015 / Accepted: 27 May 2015 / Published: 2 June 2015

Abstract: In order to increase waste recycling, many studies have been conducted to understand factors that may influence waste recycling behaviour. However, these studies have focused on household contexts rather than other waste generation contexts. As a result, this paper seeks to provide a detailed analysis of previous studies on workplace waste recycling behaviour. Drawing from different databases, 51 relevant studies on workplace waste recycling attitudes and behaviour were meta-analysed. Findings showed that the highest percentage of the existing studies were conducted in the USA, focused on a single waste stream, were often conducted within academic contexts, adopted (or modified) an existing theoretical framework and were based on questionnaires which elicited self-reported behaviour. Some of the factors identified include demographics, situational variables, past behaviour, incentives, prompts and/or information, attitudes and identity. The findings highlighted the scale of challenges confronting waste management practitioners in understanding the factors that may affect waste recycling behaviour due to the complexity and heterogeneity of human behaviours. However, the results from the reviewed studies in this research suggest that a combination of different factors may be required to influence workplace waste recycling behaviour. This may provide effective incentives to develop a framework that may assist waste management stakeholders when addressing workplace waste management.

Keywords: recycling; workplace; waste; waste management; attitudes; behaviour; household; meta-analysis

1. Introduction

For many years now, waste recycling has been attracting considerable attention from policy makers and other environmental stakeholders in order to address the issues of waste production [1]. This has resulted in the formulation of different policies and strategies at local, national and international levels. A typical example is the functional legal framework within the EU member states. This framework could be traced back to the emergence of the 1975 Framework Directive on Waste (as amended in 1991) which led to the present revised Waste Framework Directive (2008/98/EC) of the EU [2].

Behavioural and lifestyle changes are widely held to be a major solution to the current problems of waste production [3]. Understanding individuals' waste recycling attitudes and behaviour, therefore, has been identified by waste management practitioners and academics as an effective strategy in addressing the issues of waste production. This may be attributed to the prominent consideration given to environmental protection in human decision making [4], and may also be associated to the inability of technology to address all the issues of waste production. The consideration may be as a result of increasing awareness of the environmental impacts and the knowledge that human activities are detrimental to the sustainability of the natural environment through waste production. The increasing concern about, and awareness of, waste production and its effects has led to a wide range of studies being conducted which are aimed at understanding factors that may enhance waste recycling behaviour. Although recent efforts are focused on waste recycling behaviour and its determinants, it is evident [5,6] that household waste is attracting more attention compared to other waste generation contexts. However, this inconsistency is not only associated with waste recycling literature/practices but is also observed in relation to other environmental issues. For instance, Plank [7] observed that there is more emphasis on sustainable behaviours in household contexts compared to workplace contexts and concluded that workplaces have been relatively overlooked.

As a result, different factors influencing household waste recycling behaviour were identified and documented in the household waste recycling behaviour literature. These include demographics [8–11]; rewards [10]; and feedback [12]. Other factors identified in the literature include scheme design [13]; scheme knowledge [14]; environmental concern [15]; antecedent behaviour [16]; and personal norms [17]. However, studies have shown that people do not exhibit similar environmental [6], sustainability [7] or waste recycling [5] behaviour while away from home. While there is sufficient evidence about the factors that may affect household waste recycling behaviour, the factors that may influence workplace waste recycling behaviour are less understood. This may explain the inconsistencies being observed in environmental (or waste recycling) behaviour across different contexts [5,6,18].

Therefore, the main aim of this paper is to quantify the extent of research on workplace waste recycling behaviour in order to inform the design of a framework that may enhance workplace waste recycling. The objective is to provide a quantitative and cumulative assessment of emerging studies and findings about waste recycling behaviour within the workplace context. As a result, this paper attempts to provide answers to the following research questions:

(1) What is the extent of studies on workplace waste recycling behaviour?
(2) What are the characteristics (such as the location, the research methods and the contexts) of the available studies on workplace recycling behaviour?

(3) What are the major factors perceived to be influencing workplace waste recycling?
(4) How can these factors enhance the present knowledge and understanding of workplace waste recycling behaviour?

In order to quantify the extent of research conducted hitherto on workplace waste recycling behaviour and also to understand its influencing factors, this paper seeks to provide a comprehensive and cumulative analysis. In other words, it presents an analytical review of the previous studies on workplace waste recycling behaviour. The rationale is to identify various factors believed to have influence on waste recycling behaviour in the workplace context that were reported in the previous studies. As a result, no specific industry or sector was considered when accessing and retrieving the available studies on workplace waste recycling behaviours. In other words, every attempt was made in this research to analyse studies conducted hitherto on workplace waste recycling behaviours regardless of work context. Also, this paper is intended to examine the prevailing practices and approaches adopted by previous authors in their investigations. To achieve the aim of this study, meta-analysis that provides an opportunity to make plausible conclusions from different empirical studies was used. While the approach has been orthodoxly restricted to analyse quantitative empirical studies, how to determine the extent of studies to include in meta-analysis now remains a critical challenge. Using this approach, the effect size from individual study retrieved for meta-analysis is considered as the main unit of analysis [19] instead of organisations or people.

1.1. Pros and Cons of Meta-Analysis

Meta-analysis is a statistical analysis technique used to assess statistical significance or effectiveness of constructs, factors and intervention strategies by combining findings from different independent studies. In other words, meta-analysis is a statistical approach to synthesise the findings of various studies related to the same topic or outcome measure [19]. Although meta-analytic review has been subject to criticism, the approach elicits a statistical summary of aggregated studies that are included in meta-analysis using a systematic procedure unlike the traditional narrative reviews that involve no specific sampling procedure [20] and are therefore characterised with the inherent subjectivity that brings.

1.1.1. Pros

According to Lipsey and Wilson [21], meta-analysis is adjudged to enhance constructs validity by combining findings of different empirical studies that investigated similar constructs. This is based on the assumption that published studies were conducted with high rigour. As a result, meta-analysis is performed to identify and establish how statistically significant the constructs under investigation are, based on the estimation of effect size. In meta-analytical review, the focus on effect size instead of sample size suggests that all studies (significant, small significant and no significant effects) can contribute to the overall findings [21]. This allows revelation of cumulative knowledge in existing studies and may also prevent wasting of valuable research resources [22]. As a consequence, meta-analysis is not only capable of controlling Type 1 (reporting relation when there is not) error but also addressing Type II (reporting no relation when there is) error [22]. Also, meta-analysis is capable of assessing consistency and generalisability of findings from one study to others [20,21]. While

meta-analysis shares similar fundamental processes (such as literature search) with narrative reviews, subjective decisions are mitigated by systematic procedures being used in meta-analysis unlike narrative reviews [20].

1.1.2. Cons

While meta-analysis is associated with many positive attributes, the approach is not immune to criticism. The most obvious criticism in meta-analysis is based on its inherent bias through the inclusion/exclusion criteria imposed subjectively by meta-analytic authors. As the most important journals are published in the English language, the inclusion of studies conducted in languages other than the English language is practically unlikely and findings from such studies would not be accounted for in meta-analytic reviews. The exclusion of studies conducted in other languages [23] in meta-analytic review, therefore, suggests that meta-analyses are susceptible to language bias. In addition, reviewing only published studies could result in the overestimation of specific factors/constructs given that studies with significant findings are more likely to be published. In meta-analysis, this is termed file-drawer problem and could lend meta-analyses a publication bias [23]. File-drawer problem [20,23] occurs as a result of deliberate decisions of authors (or reviewers) to retrieve and review studies with only publishable results. In other words, file drawer problems arise when only papers that reported statistically significant results are published and retrieved for meta-analysis while those (unpublished) that reported insignificant results are not consulted [24]. These biases (language and publication) in meta-analyses may obliterate important factors that could inform policy or other intervention strategies especially when addressing human behaviours. On the other hand, meta-analysis has been criticised for mixing "apples and oranges" by combining different studies with various theoretical and methodological approaches [21]. Further, the estimation of effect size may be biased due to the influence of sample size [21], making statistical analysis of retrieved studies more complex [24] and less reliable, given that meta-analysis considers individual effects such as differences between means. Having assessed the advantages and disadvantages of meta-analysis, the approach was perceived as the most appropriate technique for producing an accurate account of this body of work.

2. Research Method

2.1. Data Collection

To collect data for this study, only the previous studies conducted and published in English Language were identified, retrieved and reviewed. Although the approach may introduce language bias [25] that may lead to publication bias [23], the importance and the direction of the effects of language bias in meta-analysis is still ambiguous. According to Jüni *et al.*'s [26] investigation on language bias, their findings demonstrated that the exclusion of non-English studies in meta-analytic review has little to no effect on summary estimates. The study [26] further observed that the effect of exclusion of non-English studies on individual meta-analyses is difficult to estimate. However, the inclusion of studies conducted in other languages may introduce publication bias into meta-analytic review. This is based on the observation that some countries (such as China and Russia) are only publishing studies that reported significant or positive results [27]. Nevertheless, every effort was made to search and include grey

(informally published) literature in this analysis. The inclusion of grey articles was to reduce the effects of "file drawer problems" [20], and to ensure that every relevant study was assessed.

In addition, certain eligibility [21] criteria were adopted for this study in order to access and review all the studies conducted on workplace waste recycling behaviour. The inclusion criteria imposed for this analysis are as stated below:

(1) The study must be available in the English language.
(2) The study must address waste recycling within a workplace context.
(3) The focus of the study must be on waste recycling behaviour and its attributes.
(4) Studies conducted within household and other waste generation contexts are not considered to be relevant in this analysis.

However, no cut-off point or specific time-frame was considered as part of the eligibility criteria; this is due to a paucity of research within this context. In addition, the decision not to include any time-frame reduced or eradicated the possible effects of stochastic variation [28], such as omission of the studies that may fall outside the cut-off point.

Therefore, the approach used in this study involved an online search and content analysis of different research databases. Consequently, Google scholar was used as the initial point of contact for general search to identify relevant studies including their repository sources. Google scholar provides a base repository, bringing together all the relevant studies from various sources and disciplines that fall within the inclusion criteria of this analysis. As a result, a search syntax was developed and input into Google scholar search engine as an approach to identify different studies including various databases of relevant journals and articles.

In order to retrieve all the relevant studies, ancestry and descendancy (this allows the identification of other studies from the references and citations of relevant studies); and abstracting techniques [29] were also used. This allows the references of candidate studies to be screened so as to identify and retrieve relevant studies not already examined [21]. Consequently, databases visited included Science Direct, EBSCO, JSTOR, APA and Web of Knowledge. In addition, the university inter-library loans service was utilised for the studies that are not accessible due to the limitations of the university's subscription system. Also, some papers were requested directly from their authors through email having secured personal contacts through ResearchGate—an intellectual social media site. After several iterations of this method, a total of 51 relevant articles were identified for inclusion in this study. The contents of the available literature were then analysed, categorised and coded according to the themes, patterns and approaches used to uncover factors that may influence workplace waste recycling behaviour as identified in the reviewed studies.

2.2. Data Analysis Approach

The first objective of this analysis was to quantify the extent of previous and available waste recycling behaviour studies with respect to workplace contexts. As a result, these studies were aggregated and coded based on different themes. These include the context of the study, the location of the study, the method used for the investigation, the year of publication, the waste streams investigated and the findings. Following the coding of relevant studies, SPSS statistical package was used for data input and

analysis. Descriptive statistics were then performed to understand the basic features, frequencies and characteristics of the studies.

3. Research Findings

In this paper, only the findings of descriptive analysis are reported to elicit the characteristics and extent of the existing studies on workplace waste recycling behaviour. From the search of various databases, 51 relevant and useful studies conducted within workplace contexts were identified, retrieved and analysed. Therefore, the findings from this analysis are coded and sub-classified under different themes as previously stated in Section 2.2.

3.1. Characteristics of the Studies

3.1.1. Publication Period

For this analysis, there is an assumption that year of study will influence other factors such as workplace context, study location, waste stream(s) and research method or investigation approach. As a result, the publication years of studies were sub-grouped (coded) using a 10 year scaling interval starting from the 1960s until the 2010s. Although this time scale was not included as part of the search criteria, the search returned no empirical or theoretical studies for the 1960s. However, the first generation of studies on workplace waste recycling behaviour were observed to be published in the 1970s according to the findings of this research. As shown in Figure 1, therefore, most of the studies retrieved were conducted in the 1990s representing about 37% of the entire studies. However, the trend dropped by 17% to about 20% in the 2000s but rose to about 26% in the 2010s. Whilst it has not been proven empirically, different factors such as increasing awareness of the consequences of human impacts on the environment may be responsible for the amount of studies conducted in the 1990s. Other factors such as the state of the economy, social trends and the concern over the depletion of natural resources may have influenced the instigation of these studies. These observations are supported by the publication of the Brundtland Commission report, Our Common Future, in 1987 [30] leading to the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, and the adoption of Kyoto Protocol in 1997.

However, the global economic recession and dispute over the causes and effects of climate change may be accountable for the reduction in the studies conducted between 2000 and 2009. On the contrary, it may be suggested that the public concern about the issue of sustainability and perceived knowledge that behavioural change is required to address waste production [3] may have influenced the renewed interest in the environmental or sustainability behaviour research. This may consequently be responsible for the recent increase in the amount of studies undertaken on workplace recycling behaviour from the period of 2010 onward, as illustrated in Figure 1.

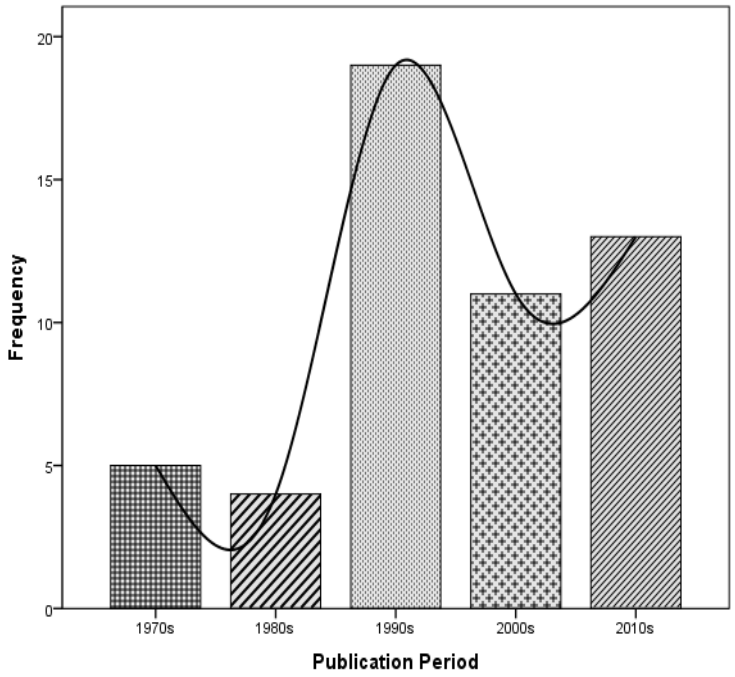

Figure 1. Period of publication.

3.1.2. Workplace Context

The types of workplaces identified in the studies were coded and classified under general office setting, academic (including dormitories, classrooms and offices) context, hospital environment and others (comprises studies with no specific workplace context). The findings from the descriptive analysis (Figure 2), therefore, showed that the highest number of these studies was conducted within an academic context (40 studies), representing about 78% of the entire sample. This is observed to be followed by general office settings (eight studies) which represents only 16% of the entire sample. However, the analysis showed that one study failed to indicate a particular workplace. The study [5] may not consider any specific workplace for ease of data collection. While the study was conducted to uncover a relationship between household and workplace waste recycling behaviours [5], it may be appropriate for logistical reasons to access the respondents from their household settings.

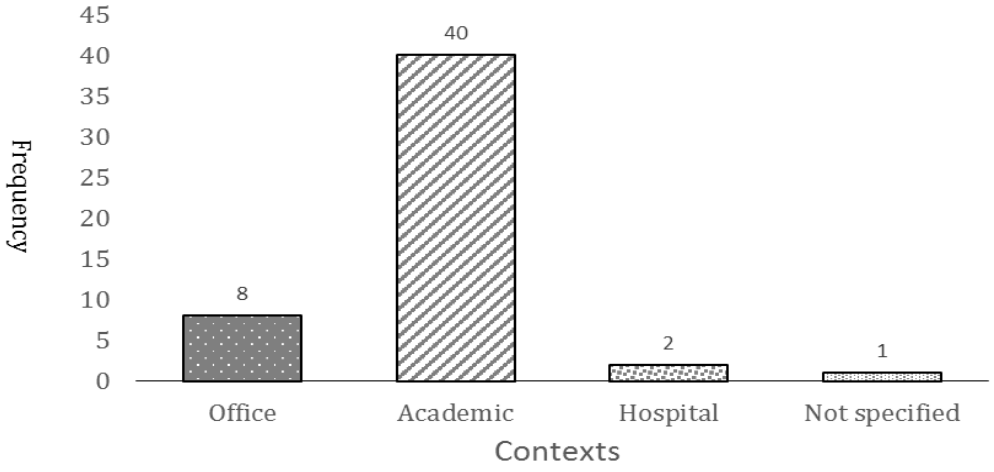

Figure 2. Workplace Contexts.

This result may be influenced by the perceived and increasing role of academic institutions in promoting sustainable (and particularly waste management) education and practices. It may also be that recycling is considered to be the most recognised, obvious and feasible environmental (or conservation) sound activity that any academic institution could implement [31].

3.1.3. Waste Stream

Further, the waste streams investigated by each study were coded using (non-hazardous) key recyclables: plastic, paper, metal (including cans), glass (including jars), textiles, food waste and garden waste. Others include studies with multiple and no particular waste streams. It is observed from Figure 3 that the existing studies on workplace waste recycling behaviour were focused more on waste paper (and paper products) compared to other waste streams.

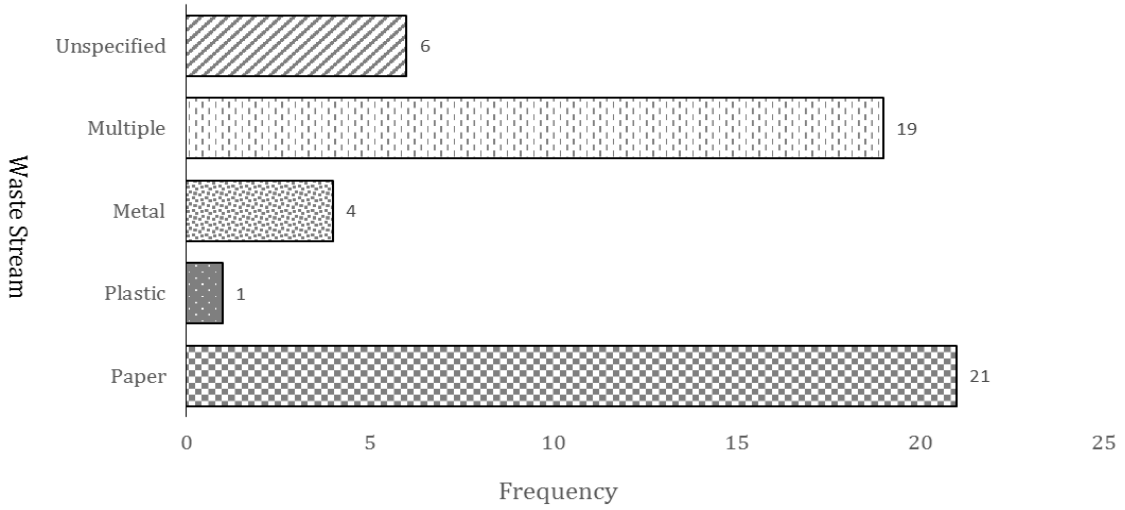

Figure 3. Waste streams investigated.

This represented about 41% of the waste streams based on waste by waste analysis (individual waste), while 37% of these studies used multiple waste streams and about 12% failed to identify a particular waste stream.

The amount of studies on paper recycling behaviour may be influenced by the context (academic) in which the majority of these studies were conducted (see Figure 3) or by the economic importance of paper and its associated products. As a result, one may suggest a positive correlation between context (see Figure 2) and waste stream (see Figure 3) under consideration. This observation was supported by the findings of both Oskamp *et al.* [32] and Hamad *et al.* [33]. While Oskamp *et al.*[32] argued that paper products constituted the largest portion of recycled materials by businesses in the USA, Hamad *et al.* [33] concluded that the decision to utilise recycled materials was due to economic/financial reasons (*i.e.*, product with the highest cash values).

3.1.4. Study Location

In order to estimate the extent of workplace waste recycling behaviour studies in each geographical location, each study was coded by study location. According to this country by country analysis

(Figure 4), more studies were conducted in the USA (61%) compared to other countries. From a UK waste perspective, it is interesting to note that the findings showed that majority of these studies were conducted outside the UK representing about 90% of the studies reviewed compared to about 10% conducted in the UK.

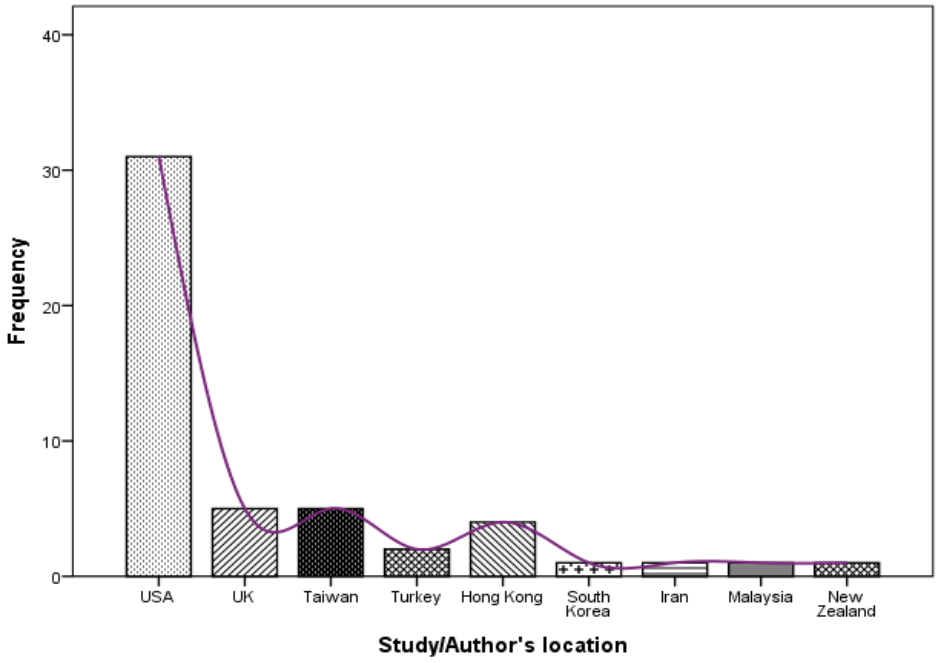

Figure 4. Study location.

As a result, the frequency distribution (as illustrated in Figure 2) shows that 31 studies were conducted in the USA while only five studies are from the UK, five studies are from Taiwan, four are from Hong Kong, two are from Turkey, and there is one study each from New Zealand, South Korea, Malaysia, and Iran. The rationale for the amount studies in the USA may be influenced by the concerted and increasing efforts to divert waste from landfill. This was due to the public perception that the landfills in the USA are running out of capacity with no new sites available for additional landfill [34,35].

3.1.5. Investigation/Research Approach

Various methods were identified from the reviewed studies, suggesting that researchers always have an array of different approaches to choose from when investigating [36] human behaviours. The methods identified from the reviewed studies include: questionnaire surveys, experiment/observation, interviews, focus groups and mixed methods. In this analysis, focus group and interviews were coded separately while the studies with more than one method were categorised under mixed methods. Although these studies did not report mixed methods, they were categorised under mixed methods due to the combination of different (particularly qualitative and quantitative) methods as used in those studies. As illustrated in Figure 5 below, studies that used questionnaire survey accounted for about 47% compared to 2% for interview while the studies with mixed (or multiple) methods accounted for approximately 12% of the studies reviewed. Although the studies were not originally reported as mixed methods, the approach in the sample includes a combination of interview and survey (2%), interview and experiment/observation (2%), and survey and experiment/observation (7.8%).

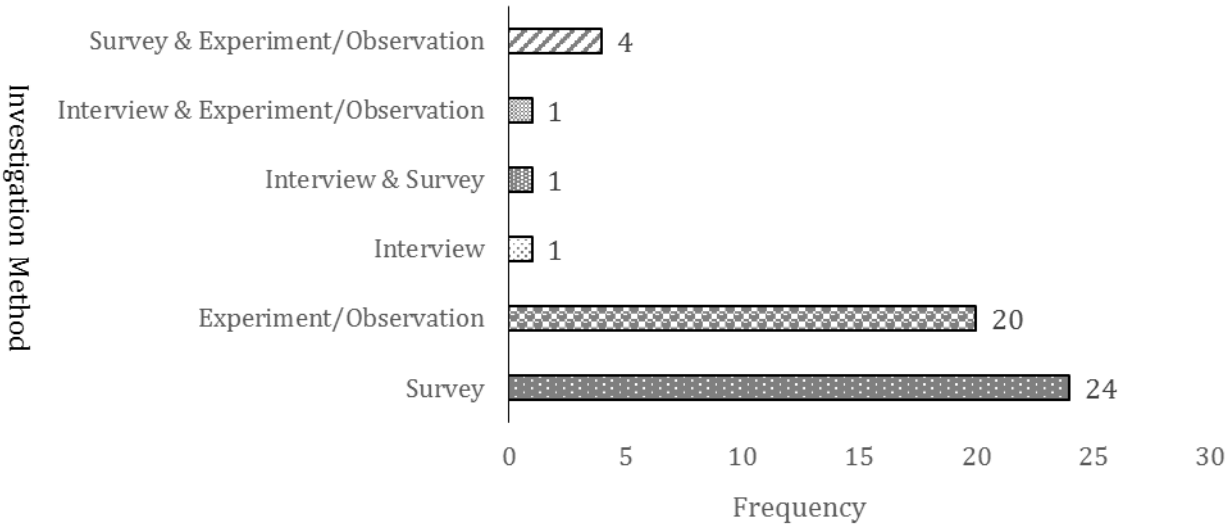

Figure 5. Investigation method.

However, the usage of an existing theory was not accounted for in this analysis. It is observed that some of the reviewed studies (for instance [37–41]) relied completely on (or modified) existing behavioural theories such as the Theory of Planned Behaviour, the Theory of Reasoned Action, or the Theory of Interpersonal Behaviour for their design.

3.2. Factors Influencing Workplace Waste Recycling Behaviour

From the reviewed studies, different factors (Table 1) influencing waste recycling behaviour within the workplace context were identified. As documented in Table 1, some of the factors investigated in those studies include demographics, prompts (information and communication), feedback, education (knowledge), awareness and incentives. Other factors include past behaviour (experience), recycling facilities (infrastructure), social (subjective and descriptive) norms, beliefs, attitudes, personal benefits, environmental benefits and identity (group and self).

Table 1. Factors influencing workplace waste recycling behaviour.

Key Factors	Number of Studies	Percentage (%)
Attitudes	24	12.83
Prompts/information/Communication	21	11.23
Proximity/Convenience	18	9.63
Education/Knowledge	11	5.88
Subjective norm	11	5.88
Infrastructure (availability, adequacy, appearance)	10	5.35
Past behaviour	9	4.81
Intentions	8	4.29
Beliefs	8	4.29
Incentives	8	4.29
Personal benefits & values	8	4.29
Feedback	6	3.21

Table 1. *Cont.*

Key Factors	Number of Studies	Percentage (%)
Organisation commitment	6	3.21
Gender	5	2.67
Awareness	5	2.67
Perceived Behavioural Control	5	2.67
Environmental benefits	5	2.67
Type/Amount of recyclables	4	2.14
Behaviour towards a Specific material	3	1.60
Moral Obligation/Norms	3	1.60
Age	2	1.07
Goal Setting	2	1.07
Educational Qualification	1	0.53
Income	1	0.53
Culture (individualism & collectivism)	1	0.53
Descriptive norm	1	0.53
Identity	1	0.53

However, the analysis of these factors showed that attitude towards workplace waste recycling behaviour is the most researched construct with 24 (or 12.83%) studies. This construct defines a social actor's feelings (positive and negative) towards behaviour and is determined by individual's evaluation of the target behaviour [42,43]. It is also observed that the relevance of attitudes was followed by that of prompts (including information and communication) with 21 (or 11.23%) studies. On the other hand, identity (group or self) and descriptive norms were the least investigated constructs with just 1 (or 0.53%) study each. This may be explained by the approach and the contexts used in those studies. Also, it may stem from the fact that most of these studies were designed to increase waste recycling rather than understand the factors that may influence workplace waste recycling behaviour. In other words, many of the reviewed studies were intervention based studies using academic contexts rather than correlational studies. As a result, different interventions such as incentives and prompts were used in order to instigate or motivate the participants to recycle with little or no influence on their recycling behaviour. This may be responsible for the decline in recycling rate experienced in those studies after the incentives were withdrawn. For example, Witmer and Geller [44] observed that the amounts of paper deposited returned to the baseline after the contingencies/interventions (raffle–personal contingency and contest–group contingency) were withdrawn. This supports the existing knowledge and proposition (especially from household settings) that financial rewards [45] cannot sustain recycling behaviour beyond the period of intervention. In addition, descriptive norms and subjective norms can either be mapped independently as a separate construct or together as a single construct or factor and coded using the umbrella term "social norm". This is corroborated by the existing knowledge that both constructs may explain the effects of an individual's subjective perception and interpretation of social pressures [46] such as that of significant others.

Considering the characteristics of the factors that were perceived to have effects on workplace waste recycling behaviour as stated in Table 1, those factors are broadly grouped under the following headings: demographics, psychological, situational and personal factors (Table 2).

Table 2. Categorisation of factors influencing workplace recycling behaviour.

Themes	Factors	Authors
Demographics	Gender	[44,47–50]
	Age	[47,51]
	Education	[47]
	Income	[47]
Psychological	Intentions	[37,39,40,50,52–55]
	Attitudes	[1,32,37,39,40,47,51,56–59], [48–50,52–55,60–65]
	Social (subjective & descriptive norms	[37,39,40,50,51,53–55,63,66,67]
	Beliefs	[1,37,47,51–53,63,66]
	Perceived Behavioural Control	[37,39–41,54]
Situational	Prompts/information/Signage	[34,38,44,47,48,56–58,60,61,63,68–76]
	Feedback	[33,52,62,73,76,77]
	Environmental benefits & values	[37,47,51,56,66,69]
	Proximity/Convenience	[1,34,35,38,40,44,45,48,49, 53–55,59,72,75,77,79,82]
	Goal Setting	[33,62]
	Organisation commitment	[32,34,38,45,51,78]
	Infrastructure (availability, adequacy, appearance)	[5,41,47,58,59,65,71,78,79]
Personal	Knowledge	[34,39,48,49,52,56,57,63,66,70,80]
	Awareness	[37,40,66,70,81]
	Incentives	[32,38,44,45,66,73,82,83]
	Identity	[55]
	Past behaviour	[5,37,38,45,50,51,61,73,84]
	Moral obligation/norms	[40,54,61]
	Type/Amount of recyclables	[5,32,49,59]
	Personal benefits & values	[1,33,37,51,58,62,67,69]
	Cultural (individualism & collectivism)	[55]

Although there is a lack of consensus on the influence of these factors on workplace waste recycling behaviour, the findings suggest that a combination of factors may be required to enhance workplace waste recycling behaviour. This may assist waste management planners and policy makers when designing a policy instrument, strategy, and/or framework that could increase workplace waste recycling. To achieve this, a meta-analytical review of these factors may be required to elicit the most significant factor(s) that could enhance workplace waste recycling behaviour.

Nevertheless, factors such as demographic variables [47]; situational/personal variables [5,37,51,56,57,68,70] and psychological factors [37,51,58,59] have been observed to influence workplace recycling behaviour. These factors may serve as predictors [37], motivators [38] and barriers [57] to workplace waste recycling. For that reason, it may indicate or suggest the presence of interactions or overlaps among these factors. Unlike the studies on household recycling behaviour, however, factors influencing workplace recycling behaviour remain unknown [38]. This lack of understanding could be attributable to the paucity of empirical research or lack of attention from policy makers to workplace waste recycling behaviour [5].

Taken together, one may assume that those who recycled in one context are more likely to recycle in other settings [38,45,51]. Nonetheless, studies have shown that people do not exhibit similar environmental [6] or waste recycling [5] behaviour while away from home. Further, it could not be clarified from these studies why household (past) recycling behaviour could not be transferred to the workplace context and *vice-versa*. Consequently, results from literature [5,37,38,45] suggest a lack of consensus on factors influencing business/workplace recycling behaviour leading to a misconception on the transferability of antecedent recycling behaviour to other contexts.

4. Further Research

In this paper, the factors influencing workplace waste recycling behaviour are identified and aggregated to allow the design of a theoretical framework or model as depicted in Figure 6 below.

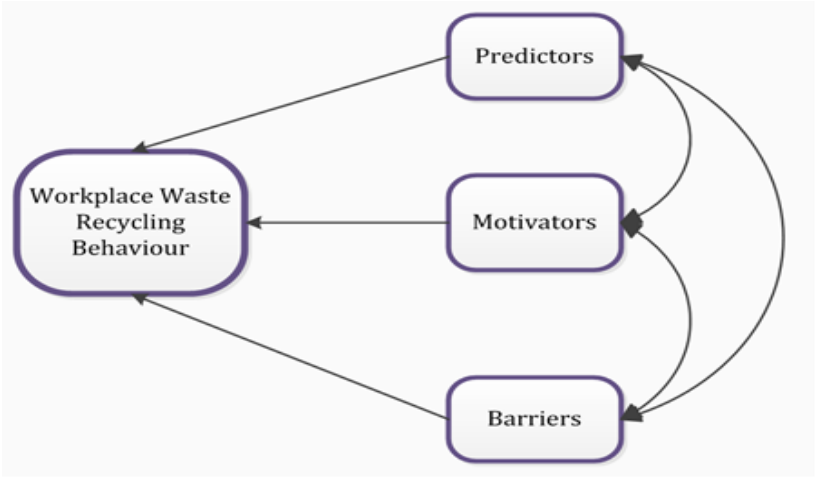

Figure 6. Theoretical model for workplace waste recycling behaviour.

From the reviewed studies, factors influencing workplace waste recycling behaviours are broadly classified and discussed under the following headings: **Predictors**, **Motivators and Barriers**. From the model (Figure 6), direct relationships between each of the identified factors (predictors, motivators and barriers) and workplace waste recycling behaviours without any moderating or mediating factors are hypothesised. In other words, each factor is hypothesised to be independently influencing workplace waste recycling behaviours; this association is illustrated by a single headed arrow from each factor to workplace waste recycling behaviours. Also, the model assumes correlations (or covariance) between the identified factors (or constructs), and these correlations may be positive or negative and significant or non-significant. The correlational links in this theoretical model are represented by two headed arrow between predictors and motivators, predictors and barriers and between motivators and barriers. This is a major assumption or research problem that the future research will be seeking to address (and validate). The complete model is not only hypothesising direct relationships between each factor and workplace waste recycling behaviours but also attempting to demonstrate how these factors could interact together in influencing recycling behaviours at work. These factors are further explained below for a better understanding of the theoretical model in Figure 6.

4.1. Predicting Factors

The term, "Predicting Factors" is used in this model to illustrate those variables/factors that form association(s) with waste recycling behaviour and could determine whether an individual would recycle or not. As identified from the reviewed studies on workplace waste recycling behaviours, these factors include Age [47,51], Education [47], Gender [44,48] and Income [47]. Similarly, Attitudes [37,51,56–59,70], Identity (Self and Group) [55], Intention [39,40,50,52–55], Past-behaviour [45,73], Behavioural control [40,54], Type/Amount of recyclables [32,59], Personal values, and Culture (individualism and collectivism) [55]. These factors may also interact with other major factors in the model in order to influence workplace waste recycling and may conceptually distinguish recyclers from non-recyclers. Although these factors are observed to focus on "who" aspect of waste recycling, there is a lack of clarity on the characteristics of (non)recyclers [8]. More studies are therefore required to investigate the relationships between these factors and workplace waste recycling behaviours.

4.2. Motivating Factors

Within the context of this study, motivating factors are conceived to be factors that could activate and/or influence individuals' conscious and deliberate decisions to recycle. From Table 2 above, it can be suggested that some of the predicting factors may also motivate an individual to engage in waste recycling scheme. These factors are observed to form a bridge between predicting factors and barriers to waste recycling behaviours. As identified from the reviewed studies, these factors include Awareness [70,81]; Beliefs [52,66]; Environmental benefits & values [37,47,51,69]; Feedback [52,62]; Goal Setting [33,62]; Incentives & rewards [38,44]; Prompts/information/Signage [48,56–58,70]; Proximity/Convenience [34,75]; Social (subjective & descriptive) norms [40,50,53–55]; Organisation commitment [34,45]; Infrastructure (availability, adequacy and appearance) [65,71]; Knowledge [48,56]; Moral obligation/norms [54,61]; Personal benefits and values [37,58], and Culture (individualism and collectivism) [55]. While most of these factors are mainly extraneous in nature, the endurance of such extrinsic factors in reinforcing recycling behaviours over a long period of time is another challenge. However, authors (such as [33,66]) have demonstrated that extrinsic motivations such as monetary rewards [42] cannot sustain recycling behaviour when compared to other factors such as feedback [77], organisation [58] and individual [45] commitment. In other words, behaviour may return to the status quo after the extrinsic incentives are withdrawn, corroborating previous studies [38] that extrinsic factors can only provide short-term effects.

4.3. Barriers

In this study, behavioural barriers are conceived to be factors that could prevent social actors from participating effectively in waste recycling. Different authors have identified and established various factors that may inhibit waste recycling behaviours in their studies. According to these studies, for example [18], most of these factors are attributed to the effects (and interaction) of personal and situational factors. These factors include Social status [55], Beliefs [1], Monetary incentives [66,82], Proximity (location/distance) [72,75], Recycling facilities (availability, adequacy and appearance) [5,44], Past behaviour [39,50] and Type/Amount of recyclables [5,51]. This suggests that recycling schemes

that require a significant amount of personal effort with increasing behavioural costs may be unpopular and could also inhibit participation. As a result, any intervention approach aiming at enhancing recycling should be designed to remove/reduce recycling barriers in order to be effective. Notwithstanding, and to practically reduce or completely eliminate recycling barriers, conflicts between personal and situational variables should be addressed through scheme design.

However, it is observed that these factors may interact or overlap with one another to prompt associations or causal relationships. As a result, the next stage of analysis is to identify and estimate the nature of relationships or interactions that may exist among these factors. This will not only provide an opportunity to delineate important factors (constructs) that may significantly influence waste recycling behaviour but will also assist in identifying relationships among these factors. In order to achieve this, the next stage is to extend the meta-analytic review of these studies. The analysis would involve the calculation of the "effect sizes" [21] of these studies in order to determine how statistically significant the identified factors are in relation to waste recycling behaviour.

Although meta-analysis is developed and predominantly used to encode and analyse quantitative studies [21], the approach has been extended to meta-analysed studies within qualitative research [85] methods. For example, Park and Gretzel [86] adopted qualitative meta-analysis to summarise and draw conclusions about the factors that enhance marketing websites success. Also, Timulak [87] adopted a qualitative meta-analysis approach to identify the categories of impact of helpful events in psychotherapy based on clients' perceptions. Unlike quantitative meta-analysis, the purpose of qualitative meta-analysis is not to establish causal relationships or identify significant factors from several studies but to develop a grand theory, a mid-range theory, or a theoretical framework [85] from different qualitative studies investigating similar constructs.

However, due to different research methods used in the studies reviewed in this paper, one of the challenges is to encode findings from these studies that will allow statistical combination and comparison. Consequently, one possibility is to adopt an innovative approach that termed "meta-analytical triangulation procedure". The intention is to overcome the problem of comparing and analysing "apples and oranges" that is understood [21] to be associated with meta-analysis of studies with dissimilar methodological orientations.

5. Conclusions

From this paper, it can be concluded that workplace waste recycling is receiving little attention from policy makers, academe and other stakeholders. As a result, this paper offers support for the existing research that established a dearth of studies on workplace waste recycling behaviour. In addition, it shows that many of these studies were conducted in the USA, focused more on a single waste stream, and were conducted within an academic context. Also, different factors identified in the existing studies perceived to have influence on workplace waste recycling behaviour were further analysed in this paper.

Although there is little knowledge or understanding about factors influencing workplace waste recycling, it is evident from this paper that a combination of factors may be required to effectively enhance workplace waste recycling. This present paper, therefore, demonstrated that factors influencing workplace behaviour may be aggregated into demographics, psychological, situational and personal factors. This may assist waste planners and policy makers when designing a strategy or framework for

workplace waste recycling. Based on the existing knowledge, this paper further suggests that holistic strategies that could address issues of waste production from different contexts are required in order to reduce the amounts of waste being sent to landfill. Finally, this paper concludes that waste production from different contexts must be addressed in order for any country such as the UK to divert a substantial amount of waste from landfill.

Conflicts of Interest

The author declares no conflict of interest.

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