**Group Term Project:** Group term project (40% of the mark with Peer assessment counting for 20% using WebPA) in which students will have to survey the literature on a specific DEA-related area of their choice (conditional to approval by the lecturer), which could be application-oriented (option 1) or methodology-oriented (option 2), and classify and critically analyse such literature.

**Submission:** The submission of the group term project should include a *word file* with a maximum word count of 5000 words not including appendices (details on the format of the term project will be provided hereafter), *pdf files of references* in a folder named “references” with each file/paper named after the authors and the year of publication (e.g., Charnes et al., 1978; Tone, 2001; Tone & Tsutsui, 2008). The group term project should be submitted at the latest by **February 15 (Thursday), 2024 at 14:00**. The group term project word file and references folder should start with the group number along with another word file with the names of all group members and their ID number for identification. Failure to comply with these submission requirements will result in a penalty of 15% of your overall mark.

**Immediate requirement**

Each group is required to prepare a one-page proposal on the specific DEA-related area of your choice, which could be application-oriented (option 1) or methodology-oriented (option 2), that you would like to explore during this course. More details and guidance will be provided during the first lecture & tutorial during which the groups will be formed and assigned a number. Your proposal (word file) should be submitted (by email to [Jamal.Ouenniche@ed.ac.uk](mailto:Jamal.Ouenniche@ed.ac.uk)) for approval by your lecturer by **January 21 (Sunday) at 14:00** at the latest.

**Marking Scheme:** (The marking criteria to be used are the standard Business School matrix; model answers for calculations are not relevant as each application has its own answers)

Abstract (5%)

Introduction (10%)

Literature Survey (35%)

Critical Analysis (40%)

Conclusion (10%)

**Structure of group term project reports for**

**Performance Analytics with DEA: Basic Concepts and Methods**

# Option 1

**Title:** Assessing the efficiency profiles of DMUs using DEA: Survey, Classification, and Critical Analysis

Guidelines: The title should be customised to your application area to reflect what the report is about. For example, your DMUs could be countries, regions, cities, municipalities, economic blocks, companies in a specific industry or specific industries such as retail sector, FoodTech industry, agriculture industry, textile industry, fashion industry, FinTech industry, insurance industry, banking industry, telecommunication industry, semiconductor industry, pharmaceutical industry, tourism industry, etc.

**Abstract:** xxx

Guidelines: The abstract should state the main purpose of the report, be concise, and summarise the main findings and recommendations based on your critical analysis of the literature you covered in your survey.

**Keywords:** DEA, xxx

Please note that the order of completing the sections of the report doesn’t need to be linear; to be more specific, once you have chosen the application area and research problem (i.e., evaluation of the efficiency profiles of DMUs) and obtained the approval of your lecturer, you should start with the literature survey (section 2), then the critical analysis (section 3). Finally write your conclusion, introduction and finish with the abstract.

1. **Introduction**

Guidelines – this section should include the following points:

* Why study the efficiency profiles of DMUs in your chosen application area?
* Stress out the importance of your problem and related research questions
* Stress out the importance of a literature survey on your chosen application area
* Specify the selection process of research studies on DEA in your chosen application area
* What’s new about what you are proposing / positioning of your contribution, which should be informed by your literature survey, proposed classifications, and the critical analysis
* Layout of the remainder of the report

1. **Literature Survey**

Guidelines

1. Your survey of the literature should be summarised in tables 1-7 (which should be moved to the appendix) and **cover at least 50 papers** relevant to your application area / problem and published in top ranked journals – see Academic Journal Guide (AJG) – old name ABS list – for 3\* & 4\* journals – unless you fail to identify relevant papers published in top journals. Also, in case you fail to find any relevant papers on your specific application, you should survey close enough application areas or problems – you should stick to this reporting format. Then, in the main text, you should also report on your survey of the literature. Your reporting however should be around classifications of the following:
2. Problems and research questions,
3. Methodologies & models,
4. Variables (e.g., inputs & outputs, environmental variables),
5. Data (e.g., DMUs & Periods of analysis),
6. Findings, etc.

PLEASE avoid lecturing on DEA or any of its models that are covered in the classroom/videos/teaching material – unless you are discussing conceptual similarities and differences between models or methodologies, only if necessary. You can however mention the advantages of DEA as compared to competitive methodologies, only if judged necessary!

PLEASE remember that the literature survey serves many objectives such as (1) learning about what has been done so far, (2) have a clear picture of the landscape of research in the field, (3) get inspired, (4) through its critical analysis you will be able to identify gaps to fill, which will drive innovation in research (your research eventually, if you choose to work on a DEA-related project for your dissertation), and (5) properly position your contribution with respect to the existing literature. ADVICE: Please consider starting with reading “survey papers or review papers” in your chosen application area to have a good idea of the landscape of research and most importantly to learn how literature surveys are done – although there is no single way of crafting a survey paper! see Iddouch K., El Badraoui K. and Ouenniche J. (2023) for a good relevant example of a literature survey paper, if you choose to survey a specific application area.

Iddouch K., El Badraoui K. and Ouenniche J. (2023). Landscape of Research on the Efficiency Profiles of Islamic Banks using DEA: Survey, Classification and Critical Analysis of the Literature, *International Journal of Business*, 28(3). <https://doi.org/10.55802/IJB.028(3).004>

**Table 1:** Summary of research problems and/or questions (guidelines: analyse this table by type of research problem or question(s) and classify them, and discuss such classification(s) in the main text)

|  |  |
| --- | --- |
| **Reference** | **Research Problem(s) / Question(s)** |
| Authors (year) |  |
|  |  |

**Table 2:** Summary of the main contribution(s) of the paper (e.g., methodology, research question(s), application): what is the selling argument of the paper?

|  |  |
| --- | --- |
| **Reference** | **Main Contribution(s) of the Paper** |
| Authors (year) |  |
|  |  |

**Table 3:** Summary of models used within DEA Analyses for assessing the efficiency of DMUs (guidelines: (a) the names of the models should be provided; (b) if statistical tests are used for analysing/comparing categories of DMUs, you should report them; (c) when a paper uses a single stage analysis, columns 3 and 4 should be filled with n/a; (d) when a paper uses a two-stage analysis, column 4 should be filled with n/a; (e) analyse this table by type of DEA approach and model and discuss such classifications in the main text)

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference** | **First Stage Model** | **Second Stage Model** | **Third Stage Model** |
| Authors (year) |  |  |  |
|  |  |  |  |

**Table 4:** Summary of Inputs & Outputs and their measures used in assessing the efficiency of DMUs and the perspective, also referred to as approach, from which the analysis is performed – we shall refer to this perspective as the assessment perspective; the assessment perspective shapes the choice of inputs and outputs (guidelines: analyse this table by perspective and for each perspective classify inputs and outputs in meaningful categories and discuss them in the main text)

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference** | **Assessment Perspective** | **Inputs** | **Outputs** |
| Authors (year) |  |  |  |
|  |  |  |  |

NOTE: Make sure that you report both the performance criteria and their measures; e.g., economy is a criterion and GDP is one of the measures of this criterion.

**Table 5:** Summary of response and explanatory variables used in the second-stage analysis of two-stage analyses and the perspective that shapes the choice of the explanatory variables – we shall refer to this perspective as the behavioural perspective which depending on the aim of the investigation could be the contextual or environment perspective or could be event related (guidelines: analyse this table by perspective and for each perspective classify explanatory variables in meaningful categories and discuss them in the main text)

|  |  |  |  |
| --- | --- | --- | --- |
| Reference | Behavioural Perspective | Response/dependent variable | Explanatory variables / drivers |
| Authors (year) |  |  |  |
|  |  |  |  |

**Table 6:** Summary of Environmental variables used in three-stage analyses for assessing the efficiency profiles of DMUs and the perspective that shapes the choice of these variables; i.e., the perspective from which the analysis is performed & environmental variables are chosen – we shall refer to this perspective as the environment perspective and should reflect the internal environment characteristics, the external environment characteristics, or both (guidelines: you are required to provide the list of environmental variables used by the authors in each reference; papers not using a three-stage analysis and thus not considering environmental variables should not be included in this table – recall that a three-stage analysis purges the efficiency scores from the effect of the environment, which requires the use of environmental variables. Analyse this table by perspective and for each perspective classify environmental variables in meaningful categories and discuss them in the main text)

|  |  |  |
| --- | --- | --- |
| **Reference** | **Environment Perspective** | **Environmental Variables** |
| Authors (year) |  |  |
|  |  |  |

**Table 7:** Summary of Number of DMUs, Period of Analysis, Sample size, and Source(s) of Data (guidelines: analyse this table by type of DMU, when relevant, and classify them into meaningful categories and discuss them in the main text)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reference** | **Number of DMUs & their country(ies)** | **Period of analysis** | **Sample Size** | **Source of Data** |
| Authors (year) | For example:  200 UK banks | For example:  2010-2021 | For example:  2200 (unless there are missing values!) |  |
|  |  |  |  |  |

ADVICE: Once you have completed reading the papers you selected for your literature survey and filled the above tables (Tables 1-7), analyse each table separately and write a paragraph or several on each table including a classification of the literature related to each of these tables. Then, craft a story to tell the reader based on these analyses of the tables. Remember, writing papers / reports / dissertations is all about crafting interesting stories to tell the reader based on facts / empirical evidence!

1. **Critical Analysis**

Provide a critical analysis of the literature and stress out the gaps in the literature and provide future research directions.

1. **Conclusion**

you know what to do!

**References**

Use Harvard formatting for references

Authors’ names (year of publication), Title of paper, *Journal Name*, Journal Issue (and number, if any); pages.

Illustrative Example:

Ouenniche J. and Carrales S. (2018), Assessing Efficiency Profiles of UK Commercial Banks: A DEA Analysis with Regression-based Feedback, *Annals of Operations Research*, 266, 551–587.

**Appendices**

Once you are done with filling the tables and analysing them, move them to the appendix to have enough space for your analysis and recommendations and for additional graphs that you would generate to get more insight.

# Option 2

**Title:** A Specific DEA-related Methodology or DEA Issue: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals

Guidelines: The title should be customised to your methodology-oriented problem or DEA issue to reflect what the report is about. For example, you can choose from these ones, if you wish to or propose your own:

* Visualisation of data in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Transformations of data in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Ratio DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Metafrontier Analysis: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Categorical variables in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Negative variables in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Non-discretionary variables in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Undesirable variables in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals;
* Choice of variables in DEA: Survey, Classification, and Critical Analysis of the Literature on Methodological Proposals; etc.

NOTE: Over the duration of the course, some of these DEA issues and methodological fixes will be presented; in that case, you are supposed to cover contributions that have not been covered in the lectures and you need to compare them conceptually with the ones presented in the lectures.

**Abstract:** xxx

Guidelines: The abstract should state the main purpose of the report, be concise, and summarise the main findings and recommendations based on your critical analysis of the literature you covered in your survey.

**Keywords:** DEA, xxx

Please note that the order of completing the sections of the report doesn’t need to be linear; to be more specific, once you have chosen the methodology-oriented problem or DEA issue and obtained the approval of your lecturer, you should start with the literature survey (section 2), then the critical analysis (section 3). Finally write your conclusion, introduction and finish with the abstract.

1. **Introduction**

Guidelines – this section should include the following points:

* Why study the methodology-oriented problem or DEA issue?
* Stress out the importance of your problem and related research questions
* Stress out the importance of a literature survey on your chosen methodology-oriented area
* Specify the selection process of research studies on DEA in your chosen methodology-oriented area
* What’s new about what you are proposing / positioning of your contribution, which should be informed by your literature survey, proposed classifications, and the critical analysis
* Layout of the remainder of the report

1. **Literature Survey**

Guidelines

Your survey of the literature should be summarised paper by paper with a focus on the methodology and **cover at least 10 papers** relevant to your methodology-oriented problem or DEA issue with a focus on the methodological proposals to fix the issue. The papers to consider in your survey are published in top ranked journals – see Academic Journal Guide (AJG) – old name ABS list – for 3\* & 4\* journals – unless you fail to identify relevant papers published in top journals. Your reporting in the main text should describe the methodology / methodological steps / models of each proposal or paper along with a conceptual comparative analysis of these proposals – don’t forget to define the notation!

PLEASE remember that the literature survey serves many objectives such as (1) learning about what has been done so far, (2) have a clear picture of the landscape of research in the field, (3) get inspired, (4) through its critical analysis you will be able to identify gaps to fill, which will drive innovation in research (your research eventually, if you choose to work on a DEA-related project for your dissertation), and (5) properly position your contribution with respect to the existing literature. ADVICE: Please consider starting with reading “survey papers or review papers” in your chosen methodology-oriented problem or DEA issue, if any, to have a good idea of the landscape of research and most importantly to learn how literature surveys are done – although there is no single way of crafting a survey paper especially on methodology!

1. **Critical Analysis**

Provide a critical analysis of the literature and stress out the gaps in the literature and provide future research directions.

ADVICE: Craft a story to tell the reader based on your survey. Remember, writing papers / reports / dissertations is all about crafting interesting stories to tell the reader based on facts; e.g., methodological fixes and their performance based on empirical evidence!

1. **Conclusion**

you know what to do!

**References**

Use Harvard formatting for references

Authors’ names (year of publication), Title of paper, *Journal Name*, Journal Issue (and number, if any); pages.

Illustrative Example:

Ouenniche J. and Carrales S. (2018), Assessing Efficiency Profiles of UK Commercial Banks: A DEA Analysis with Regression-based Feedback, *Annals of Operations Research*, 266, 551–587.