





## DISSERTATION SUPERVISION LOGBOOK

<b>Institute</b>	Institute of Information & Communication Technology
<b>Programme</b>	Business Analytics
<b>Dissertation Title</b>	<b>A data science approach on retail product placement and consumer behaviour using triangulation</b>
<b>Supervisor</b>	<b>Mr Frankie Inguanez</b>
<b>Student</b>	<b>Ms Casey Portelli</b>
<b>Student ID No</b>	<b>148704L</b>



### Note

- I. It is the **student's responsibility** to ensure that this logbook is correctly documented and maintained, and that Supervisor recommendations and signatures are acquired after each and every meeting.
- II. This logbook is to be submitted together with the dissertation.
- III. The institute reserves the right **to not accept** the student's dissertation for evaluation if this logbook is **not filled in correctly** and **duly signed** by the student and supervisor as indicated.



<b>Meeting Number : 01</b>		<b>Date of meeting : 22/10/2024</b>
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• GIT Repository</li><li>• Overleaf Template</li><li>• SOI</li><li>• Next steps</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Created git repository and shared with me. Provided official documents, find some time to go through them to be familiar. They are mostly important for the final write-up. Upload all papers/dissertations in a lit folder.</li><li>• Provided VIVA template and sample dissertation for your reference.</li><li>• Created and shared Overleaf dissertation template. Use this for write-up or else write in Word and will help with migration.</li><li>• Revise the SOI as recommended by next meeting.</li></ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
29/10/2024		



<b>Meeting Number : 02</b>		<b>Date of meeting : 29/10/2024</b>
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• SOI reviewed</li><li>• Literature papers uploaded</li><li>• Way forward</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Well done on the revised SOI, kindly consider the last few comments and upload/resubmit.</li><li>• Rename the literature manuscripts to follow the notation of "&lt;author(s)&gt; &lt;year&gt; - &lt;Title&gt;.pdf"</li><li>• Read through Jade Vella's dissertation so that you have an understanding of the expectation of a good dissertation and inspire on research methodology.</li><li>• Read through literature and add more to be able to answer the following questions:<ul style="list-style-type: none"><li>○ What datasets exist on the subject matter</li><li>○ What techniques apart from market basket analysis are used on this subject matter</li><li>○ What recommendations and or research directions do other authors identify</li><li>○ What good practice of research is undertaken (interviews, number of questions, surveys, etc.)</li></ul></li><li>• I recommend that you prepare a document (word/excel/markdown) where you take note of key points about the papers you read such as:<ul style="list-style-type: none"><li>○ Pros</li><li>○ Cons</li><li>○ Abstract</li><li>○ Literature</li><li>○ Methodology</li></ul></li><li>• Use the MCAST Library Electronic Resources since you have access to these resources with your MCAST account: <a href="https://mcast.edu.mt/electronic-library-resources/">https://mcast.edu.mt/electronic-library-resources/</a></li></ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
12/11/2024		



Meeting Number : 03	Date of meeting : 12/11/2024
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>Literature Review</li></ul>	
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>Well done on the review of current literature. Continue as you are doing. In regards to pros and cons, I was referring to what you like or dislike in the paper. What you perceive as being strong points for inspiration in your research.</li><li>Moving forward I would recommend building a table of datasets used in key research. This table should continue columns such as total number of observations/instances/rows, if available total number of features/variables/columns, if public/private, year of release. Such as the Online Retail dataset by Chen et al 2012 which was used in Karaki 2018. This will serve as justification on the choice you make about dataset (if building your own or using existing, if public or private, number of rows, and techniques used).</li><li>In my opinion the strong point of Vella 2023 is the methods triangulation.</li><li>Tamhankar et al 2018 is good for the mentioning of K-means.</li><li>I am not convinced that Shaikh et al 2021 is a very good paper. You might mention it but not giving it much importance, in my opinion.</li><li>Kurniawen et al 2018 is a very good paper/thesis and makes reference to the Apriori algorithm which is something to consider. Also the explanation of market basket analysis is very good.</li><li>Kaur et al 2016 also mentions the apriori algorithm. Try to identify if the dataset is publicly available for you to consider.</li><li>Kanagaraj et al 2016 is using Power Bi, you might want to consider this as a potential research method. Something to discuss when finalizing the research methodology.</li><li>Santos 2019 is a good paper, but not sure what to take from it for now.</li><li>Karki 2018 is a very good paper, the dataset used is public and inspiration. Something to seriously consider. The dataset is by Chen et al 2012 and available on UCI. I recommend adding Chen et al 2012 paper to your bibliography.</li><li>Refer to Nathan's dissertation for an inspiration on how to structure your literature review. Also pay</li></ul>	



attention to the section about datasets, may it serve as inspiration most importantly table 2.1.

Date of Next Meeting	Student Signature	Supervisor Signature
19/11/2024	<i>Portelli</i>	<i>F. Guzman</i>

<b>Meeting Number : 04</b>	<b>Date of meeting : 19/11/2024</b>
<p><b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b></p> <ul style="list-style-type: none"> <li>SOI Feedback</li> <li>Next week</li> <li>Table of datasets</li> <li>If the section (Other Algorithms) should be divided specifically example: predictive analytics, conjoint analysis, clustering, collaborative filtering. Or even leave it as is and then include them in sub sections.</li> </ul>	
<p><b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b></p> <ul style="list-style-type: none"> <li>Forwarded official SOI feedback, all ok can proceed.</li> <li>Next week there is the research expo, I might be unavailable and might need to reschedule.</li> <li>Well done for the table of datasets. Do not force every paper in the table, those papers for which there is no information you can leave out. Include only those papers that are providing information that help in the decision making process. It is important to include the dataset that you will be utilizing in your research. So in the research methodology you will refer to this table and argue/justify why you opted for this dataset (based in part on the information you have listed in the table).</li> <li>The current dataset table is limited to academic paper sources. Should you want to have a separate table that lists datasets that are not covered by academic papers, but are publicly available for your consideration, then this would be a good idea. I would recommend, as mentioned, to put in a separate table.</li> <li>Whilst it is understood that you are collecting a number of papers for your write-up you need to start to identify key manuscripts that you feel strong about and familiarize yourself well. Such as Karki and Chen for the dataset and potentially processing/machine learning, Jade Vella for methodology.</li> <li>In regards to entry in the dataset table for Jade Vella, I think that it would be more fair if you list the 3 data sources (6 interviews, 100 survey participants, 138 linked in profiles).</li> <li>I would recommend that you start drafting the literature review and research methodology. For the literature review refer to Nathan's and Jade's write-up and identify the key sections that you would like to do in your write-up. Then start to identify which papers to include in each section. Then jot down the key points from the papers, then paraphrase then revise for draft of write-up. The same applies for the research methodology. I would recommend that you start by writing key points of the research process.</li> <li>Use the participant information letter found in the SOI as a template, revise it and send it to me for review. Use this when approaching companies for potential data sharing. Please note that it is highly unlikely that they will provide such data.</li> <li>TODO check revised pros and cons of papers.</li> </ul>	



Date of Next Meeting	Student Signature	Supervisor Signature
03/12/2024	<i>Portelli</i>	<i>F. Signarescu</i>



**Meeting Number : 05**

**Date of meeting : 03/12/2024**

**Issues discussed at the meeting (to be filled in by Student)**

**Supervisor recommendations (to be filled in by Supervisor)**

- Paper by Huang et al 2014 can be filed under Assortment.
- Paper by Kanagaraj et al 2023 appears to be mostly AI generated, so I would recommend either not listing or not giving much importance. If you want to cite, you can list under Data Visualisation, yet I would recommend finding another paper.
- Paper by Shaikh et al 2021 falls under assortment. It is a long paper, and address a number of hypothesis (research questions) and addresses them using factor analysis (PCA). Whilst interesting it is in a certain level of detail that you do not need to get into. What you can take away from is the use of factor analysis for the study of product assortment in the retail industry.
- Well done on migrating your literature review to overleaf. Unfortunately due to a downtime on their servers I could not provide immediate feedback, will review at a later point this week.
- Well done on identifying sample datasets, will investigate further next meeting.

**Date of Next Meeting**

**Student Signature**

**Supervisor Signature**



**11/12/2024**

Portelli


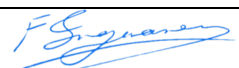
F. Enguener









<b>Meeting Number : 06</b>		<b>Date of meeting : 11/12/2024</b>
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>Literature Review</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>Well done on the progress in your literature review and migration to overleaf. Kindly consider the comments left on overleaf.</li><li>In regard to section of collaborative filtering, kindly note that it is one of two techniques used in recommender systems. I believe that you should also include a section on content-based filtering. Consider reviewing the paper by Pebrianti et al 2024 which looks to be a very good paper and aligns with your research in terms of methodology (prototype and a survey).</li><li>Try to address the comments and recommendations so to have an early initial draft of your literature review ready. Then we can proceed to drafting the research methodology. In regards to the sequence of survey and prototype, it is not really that important. What is important, is the interview as the last data gathering. So that the findings of the survey and the prototype can shape the interview questions.</li><li>To create tables on overleaf you can either use this link: <a href="https://truben.no/table/">https://truben.no/table/</a> or else switch to the visual editor on overleaf.</li><li>For the research methodology, draft it closely resembling Jade's. In regards to the research onion, we shall delve deeper into it during our next meeting. In the meantime kindly read chapter 4 of Saunders et al book.</li></ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
18/12/2024		





Meeting Number : 07		Date of meeting : 18/12/2024
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• Progress</li><li>• Next steps</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Well done on the progress in your literature review, you have a very good draft with more than 3000 words well within the word count. Start focusing on the research methodology. Move methods triangulation to research methodology. Read the chapter by Jade Vella and Chapter 4 of the Saunders et al book, focusing on the research onion.</li><li>• Follow the video tutorial and instructions provided for the 2 tutorials.</li><li>• Try to build a connection for an interview. Let me know if you need assistance on this.</li></ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
08/01/2025		





<b>Meeting Number : 08</b>		<b>Date of meeting : 08/01/2025</b>
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• Literature Review</li><li>• Research methodology</li><li>• Prototype</li><li>• Interview</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Literature review, well done on finalizing first draft. Kindly go through one last time to resolve any comments that were made and if you want to fix any grammatical errors. Will review in more depth in the next meeting.</li><li>• In regards to the draft research methodology, a good start. Kindly consider the provided comments and this will be revised and elaborated further as we progress.</li><li>• With regards to the prototype, go through the various prototypes available, see that they work and what contributions are made. Search for, if there is the need, any more recent tutorials and prototypes to be considered, for when a new dataset is made available. When you feel the time is right ask for my contribution. This can be to get a tutorial working, bugfix, adapt a tutorial for another dataset, as you feel necessary.</li><li>• In regards to the interview, really well done on the progress made. Start drafting some questions. You might want to consider the following structure:<ul style="list-style-type: none"><li>○ First 1 or two prompts should ideally be about the background of the participant. You want to try to understand how the participant has formed his/her current opinion. Educational and work experience. How long has he/she worked in the current place of work and in the current sector. Does the person have a degree or any formal education.</li><li>○ Next ask direct questions about the technology (market basket analysis, product placement). How do they operate.</li><li>○ Next section would be based on your current research. So what you have studied, observed, and ask for an opinion. (The focus in this section, is to be able to directly answer your research questions).</li><li>○ Finally, any recommendations.</li></ul></li></ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
14/01/2025		



<b>Meeting Number : 09</b>	<b>Date of meeting : 14/01/2025</b>	
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"> <li>Research Methodology</li> <li>Next steps.</li> </ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"> <li>Well done on addressing the comments provided.</li> <li>In regards to deduction vs induction vs abduction, I believe that your research is more on the deduction side, since following the interviews you shall not revise the hypothesis and experiment with new deduction methods, thus in a cycle. Rather both the prototype and the interviews serve as methods to address the original hypothesis. Consider the definition of abduction from the provided paper by gehman-et-al 2017 page 297.</li> <li>Consider the provided IEEE referencing guide for proper referencing. I will always review provide assistance.</li> <li>Excellent work in regards to the interview questions, do consider the provided comments.</li> <li>Let's meet in two weeks time. In the meantime work on prototype, literature review, survey questions. Should you need my assistance for the tutorial do reach out and let me know.</li> </ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
13/02/2025		



<b>Meeting Number : 10</b>	<b>Date of meeting : 13/02/2025</b>	
<b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b> <ul style="list-style-type: none"> <li>Interview reviews</li> </ul>		
<b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b> <ul style="list-style-type: none"> <li>Well done on progress on interviews. Continue with analysing the second interview and then documenting the research methodology and analysis section. Consider the provided structure.</li> <li>Reviewed the bibliography to fix some errors, periodically will enhance especially at the end.</li> <li>Send me tutorial/link of prototype so I can review prior to meeting and during the next meeting we discuss in detail.</li> <li>Well done on survey questions, consider the feedback provided.</li> </ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
<b>20/02/2025</b>		





<b>Meeting Number : 11</b>		<b>Date of meeting : 20/02/2025</b>
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• Progress update</li><li>• SOI revision and resubmission.</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Proceed with analyzing the interview</li><li>• Revise the survey as suggested.</li><li>• Revised the SOI, will check if I or you need to resubmit and to whom.</li><li>• IMP to focus on prototype in next meeting.</li></ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
27/02/2025		





Meeting Number : 12	Date of meeting : 27/02/2025	
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"> <li>• Implementation</li> <li>• Progress update</li> <li>• Next steps</li> </ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"> <li>• Well done on getting the tutorials to work. I recommend that you learn more what confidence, lift and support are, so you can interpret better the results. Lets focus on the groceries dataset and advance a machine learning experiment based on the 3 tutorials. The third is: <a href="https://www.kaggle.com/code/balajikartheek/market-basket-analysis-association-rule-mining">https://www.kaggle.com/code/balajikartheek/market-basket-analysis-association-rule-mining</a></li> <li>• Well done on survey progress. Attempt to achieve 100 respondents. The question of product associations is not working well so that would need to be dropped.</li> <li>• Till next meeting I will review code and propose changes, provide feedback on analysis.</li> </ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
06/03/2025		

<b>Meeting Number : 13</b>	<b>Date of meeting : 06/03/2025</b>	
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"> <li>Progress update</li> </ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"> <li>Did not have time to review code, will do so by next meeting.</li> <li>Well done on getting 109 survey participants. That is a healthy sample.</li> <li>Well done on the notes about confidence, lift, support and other metrics and techniques. These are needed for interpretation of results.</li> <li>As discussed in the meeting your next task is to go through the output of the prototype and do a lay men's terms interpretation of the results. Think of this on how you would explain the output of your prototype to the manager and owner of the businesses you had interviewed.</li> </ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
10/03/2025		





<b>Meeting Number : 14</b>	<b>Date of meeting : 10/03/2025</b>	
<p><b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b></p> <ul style="list-style-type: none"> <li>Prototype</li> <li>SOI</li> <li>Final submission</li> </ul>		
<p><b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b></p> <ul style="list-style-type: none"> <li>In regards to the final submission, the deadline so far is for the first Friday of June thus 6<sup>th</sup> June 2025. Only a digital submission is needed.</li> <li>In regard to the SOI resubmission, it has been approved and all is ok now.</li> <li>With regard to the prototype, I have provided you with a Jupyter notebook and a template to fill in various markdown/code cells. Refer to the other 3 notebooks/tutorials and ACI work to complete. Were you get stuck let me know for assistance. This is not a test, it is a research experiment, and I am here to assist.</li> <li>Will review the analysis section next meeting.</li> </ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
<b>20/03/2025</b>		





Meeting Number : 15		Date of meeting : 20/03/2025
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>Datasets</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>Consider the 3 recommended datasets from Kaggle for your prototype. They appear to real datasets.</li></ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
07/04/2025		







Meeting Number : 16		Date of meeting : 07/04/2025
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"><li>• Code review</li></ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"><li>• Well done on progress. Fixed a number of bugs, to fix one last bug.</li></ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
14/04/2025		





Meeting Number : 17		Date of meeting : 14/04/2025
<b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b> <ul style="list-style-type: none"><li>Next steps</li></ul>		
<b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b> <ul style="list-style-type: none"><li>Start drafting Abstract and Introduction</li><li>Will check code and provide feedback.</li></ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
30/04/2025		



Meeting Number : 18		Date of meeting : 30/04/2025
<b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b> <ul style="list-style-type: none"> <li>• Prototype</li> <li>• Write-up</li> </ul>		
<b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b> <ul style="list-style-type: none"> <li>• Write-up, fixed some errors in overleaf. Use the \textgreater and \textless for &gt; and &lt; symbols.</li> <li>• In regards to prototype ok, we can consider this completed. With regards to the experimentation of the different values, document your findings and observations.</li> <li>• My recommendation is that in the final part of Discussion of Results and in the Conclusion you need to take your knowledge from the prototype and the interviews to make a business case for a company on how they can benefit from these tools, whilst highlighting the challenges in adoption, focusing also on the priorities highlighted by the interviewed individuals.</li> <li>• Reviewed part of the discussion of result, consider the comments and amendments. Try sectioning the second viewpoint part.</li> </ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
05/05/2025		

<b>Meeting Number : 19</b>	<b>Date of meeting : 05/05/2025</b>	
<b>Issues discussed at the meeting (to be filled in by Student)</b> <ul style="list-style-type: none"> <li>Write-up</li> </ul>		
<b>Supervisor recommendations (to be filled in by Supervisor)</b> <ul style="list-style-type: none"> <li>Well done on progress made. Consider the recommendations provided. Good cross-section, focusing on the overlap and lack of across insights from the different research methods. Remove the final remarks section of the discuss of results and focus on the ethical considerations, making sure to mention the use of AI in this study.</li> <li>In the conclusion chapter make sure that you answer the hypothesis, research questions, identify the limitations of this study and provide recommendations for future researchers.</li> <li>In the first chapter (Introduction) it is recommended to have a part/paragraph/section dedicated to Document Structure where you go through what each chapter contains. This can serve and the general overview found at the start of each chapter and thus replaces them. Yet this is an author's (your) personal style and are free to adopt any approach suitable.</li> <li>Start reflecting on the presentation/delivery of your viva. Take inspiration from Jade's presentation, namely slide 8 where there is the triangulation of viewpoints. Replace the images with statistical information, such as number of datasets, algorithm, number of metrics used/considered. For the survey identify the number of questions and participants. For the interviews list the roles and type of store considered.</li> </ul>		
<b>Date of Next Meeting</b>	<b>Student Signature</b>	<b>Supervisor Signature</b>
12/05/2025		



Meeting Number : 20		Date of meeting : 12/05/2025
<p><b>Issues discussed at the meeting (<i>to be filled in by Student</i>)</b></p> <ul style="list-style-type: none"> <li>Title</li> <li>Research Methodology</li> </ul>		
<p><b>Supervisor recommendations (<i>to be filled in by Supervisor</i>)</b></p> <ul style="list-style-type: none"> <li>For a draft title consider: A Data science approach on retail product placement using triangulation of perspectives</li> <li>Well done on write-up To continue review from discuss of results, 2<sup>nd</sup> interview. Consider the provided comments.</li> </ul>		
Date of Next Meeting	Student Signature	Supervisor Signature
19/05/2025		



**Meeting Number : 21**

**Date of meeting : 19/05/2025**

**Issues discussed at the meeting (to be filled in by Student)**

- Write-up
- VIVA
- Logbook

**Supervisor recommendations (to be filled in by Supervisor)**

- Well done on write-up, I consider this draft near complete. Finalise for submission.
- Draft the viva for rehearsal. To notify Paul Pulis, David Debono and Mark Anthony Farrugia of assignment date on 16<sup>th</sup> June.
- Sign logbook for submission.

**Date of Next Meeting**

**Student Signature**

**Supervisor Signature**

Portelli

F. S. Gnani