Werkspot Case Study

1. Introduction

Instapro is a platform connecting customers with tradespeople for various jobs. I analyzed the platform's data to uncover insights and designed an experiment to test a new matching algorithm.

2. Data Overview

The dataset consists of two main components:

- Jobs: 5000 job orders (Job ID, Date, Location, Profession, Job Surface Area, Order Value, Responses)
- Trades people: 1000 tradespeople (ID, Name, Location, Professions)

2. EDA

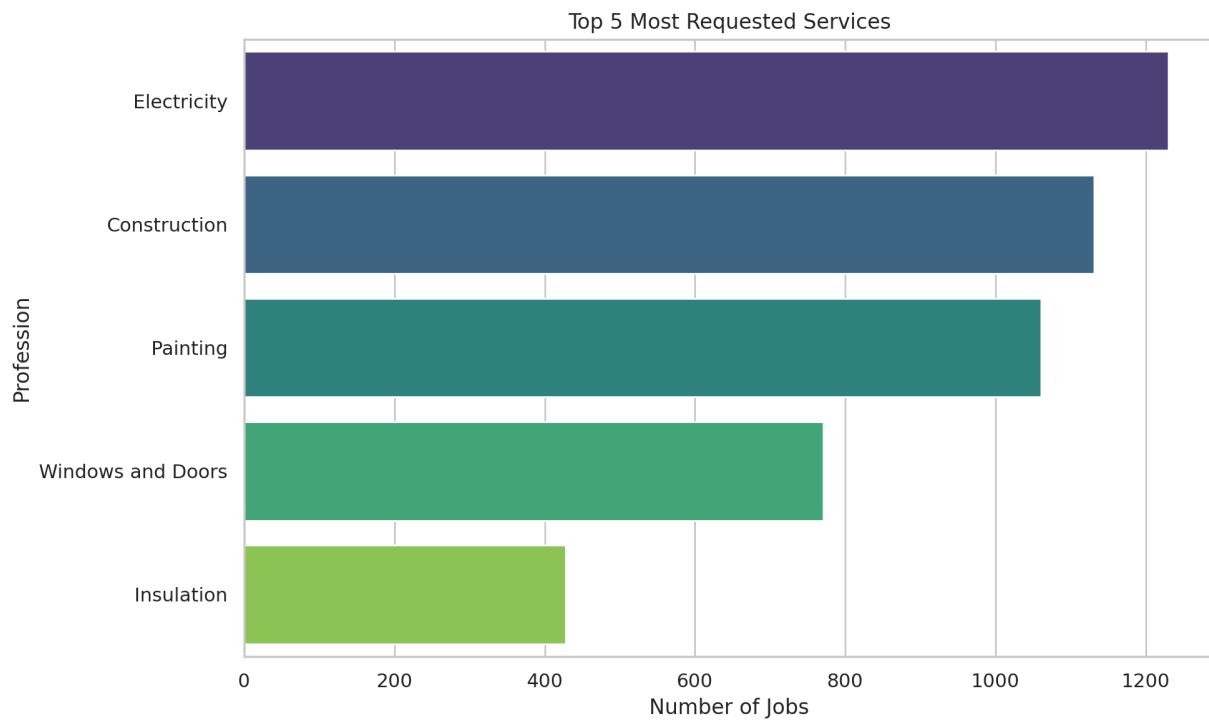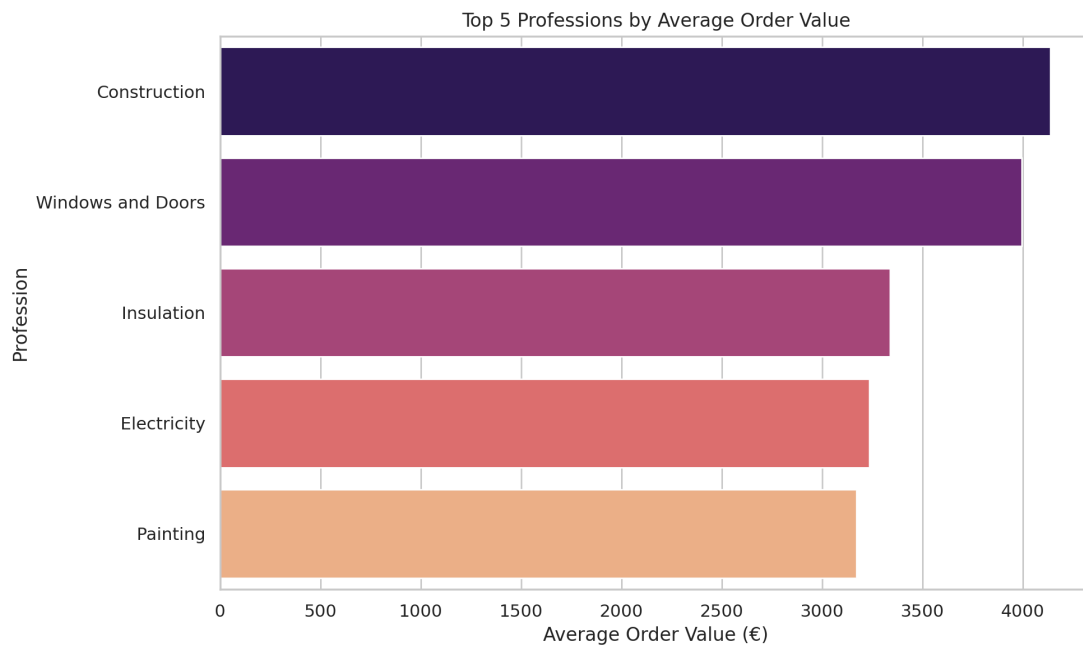## 3.1 Top Professions

Table: Top 5 Most Requested Services

Top 5 Most Requested Services

Table: Top 5 Professions by Average Order Value

Top 5 Professions by Average Order Value

Supply and Demand Mismatch:

1. Upon comparing the number of jobs with the availability of tradespeople across professions, I noticed mismatches in certain areas. For example, Electricity has the highest number of jobs but is only the 4th most common profession among tradespeople. Construction has the second-highest number of jobs but is only the 6th most common profession among tradespeople. I recommend that Instapro focus on recruiting more tradespeople in these high-demand professions

3.3 Job Size Correlation

● There is a strong positive correlation between Job Surface Area and Order Value (correlation coefficient: ~0.85)

Correlation between Job Surface Area and Order Value
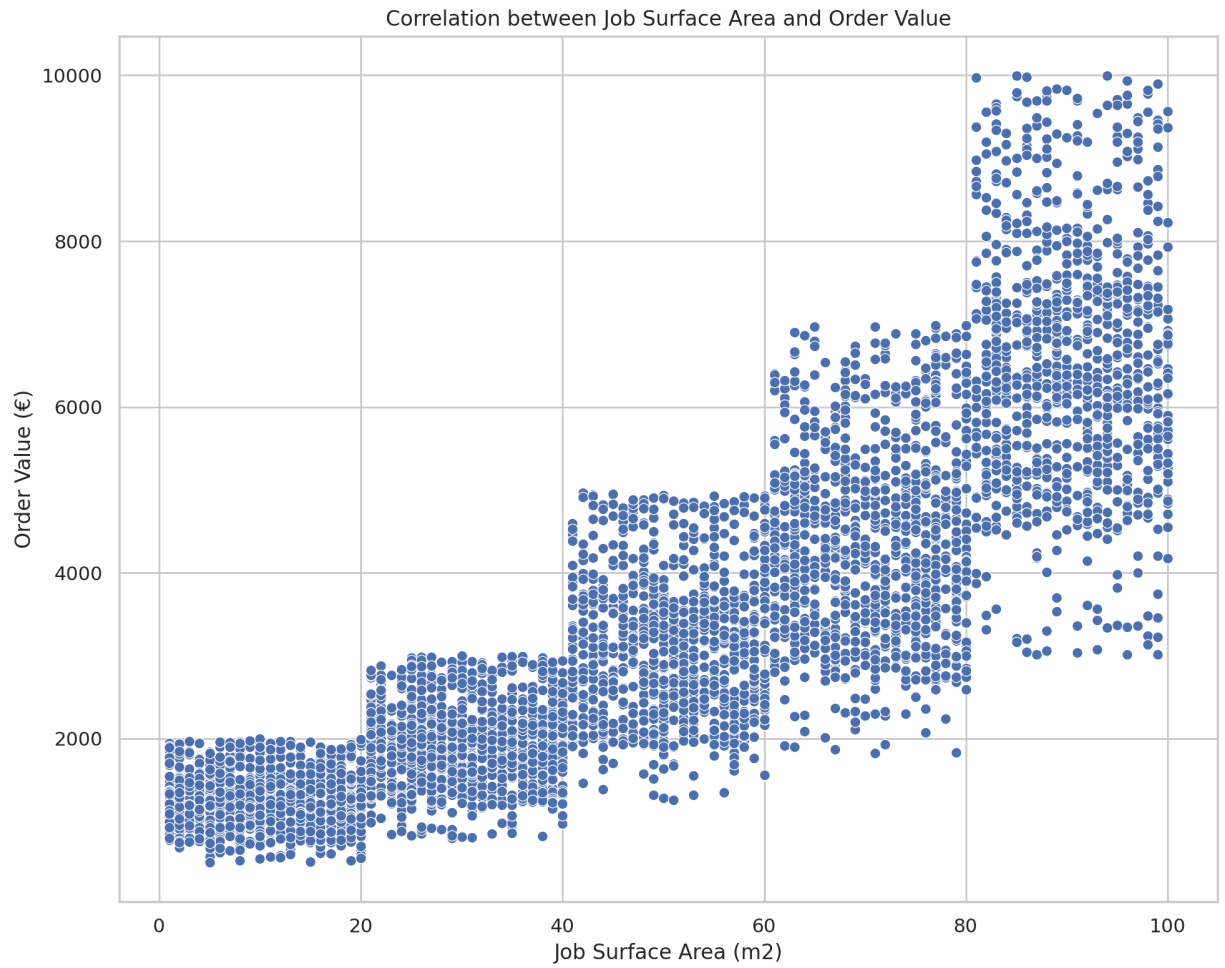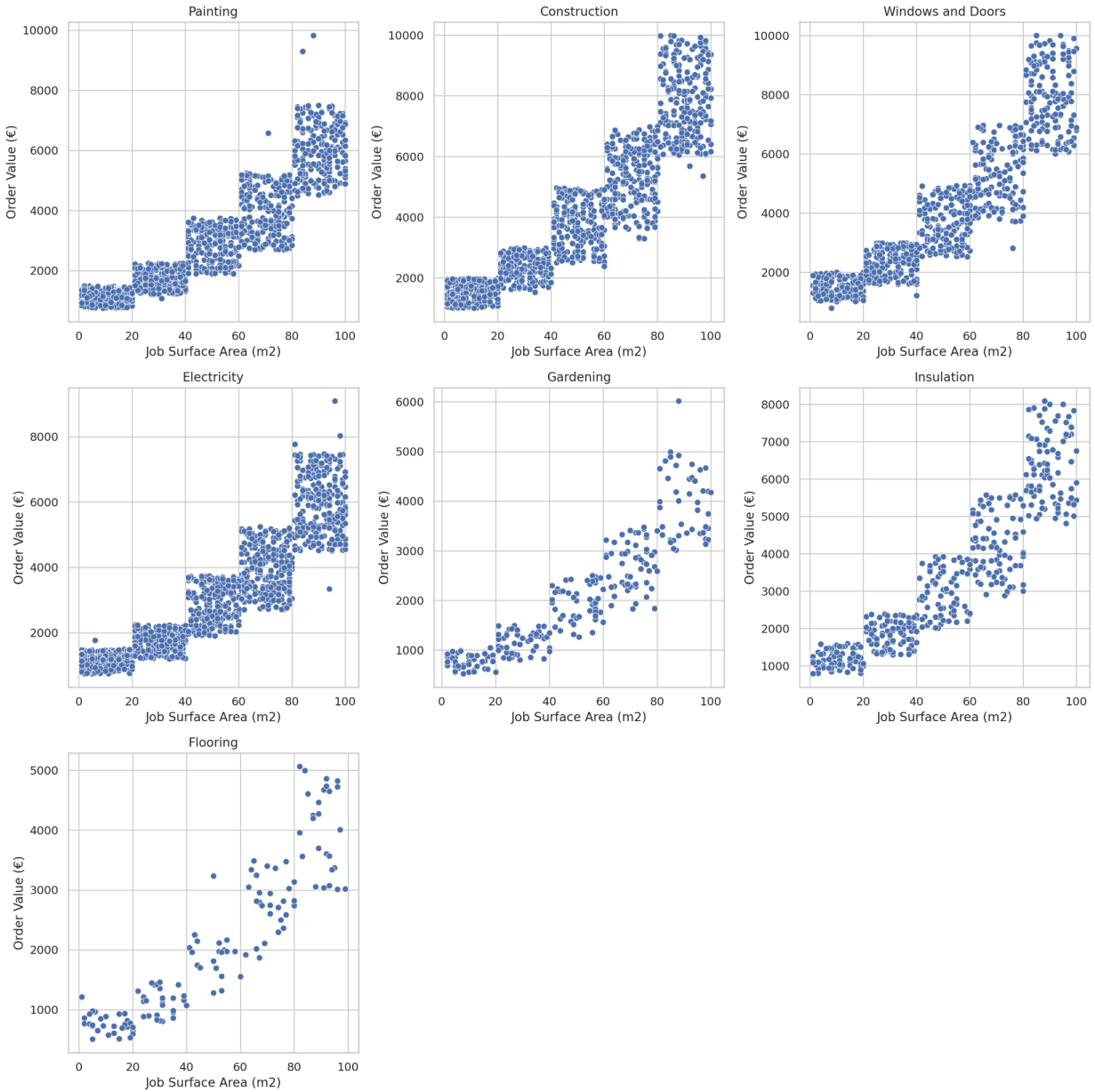
3.4 Supply-Demand Mismatch

Table: Top 5 Professions with Supply-Demand Mismatch

Key insights:

- Overall mismatch percentage: -49.25% (undersupply)

	Demand	Supply	Mismatch %
Construction	1128	250	-77.8368794326
Electricity	1227	420	-65.7701711491
Flooring	131	220	67.9389312977
Gardening	248	450	81.4516129032
Insulation	428	260	-39.2523364486
Painting	1057	510	-51.7502365184
Windows and Doors	766	420	-45.1697127937

- Construction and Electricity are severely undersupplied (-77.84% and -65.77% respectively)
- Flooring and Gardening are oversupplied (67.94% and 81.45% respectively)
- Insulation and Painting are undersupplied but to a lesser extent (-39.25% and -51.00% respectively)

Profession Performance: Job Volume vs. Order Value vs. Average Responses
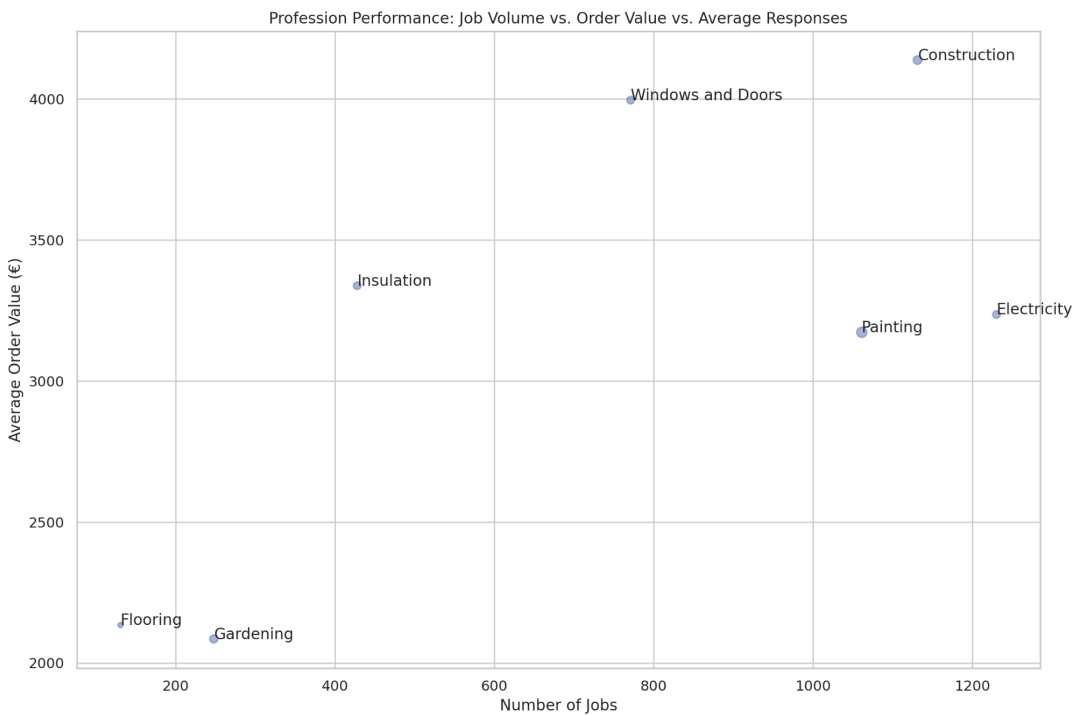
I suggest prioritizing support and resources for high-volume, high-value professions, particularly in Construction and Electricity.

- Investigate why some professions (e.g., Insulation) have higher average order values but lower job volumes. Consider strategies to increase demand for these services.

Supply vs Demand Analysis by Profession
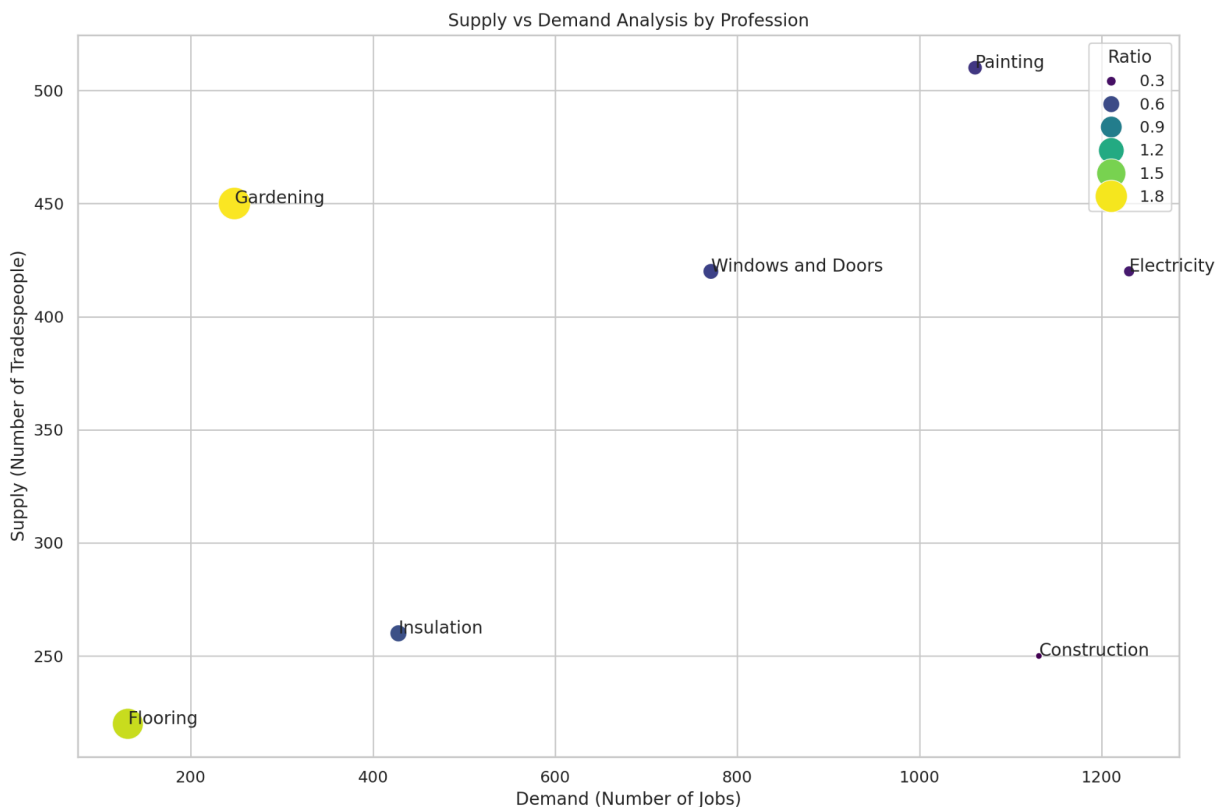
Recommendations:

- Focus on recruiting more tradespeople in underserved professions (those below the diagonal line), particularly Construction and Electricity.
- I propose developing strategies to balance supply and demand, such as providing incentives for tradespeople to enter high-demand fields or running marketing campaigns to boost demand in oversupplied areas.

3.5 Seasonal Trends

- Job numbers and revenue show seasonal fluctuations
- Peak seasons: Spring (March-May)
- Low seasons: Winter (December-February)
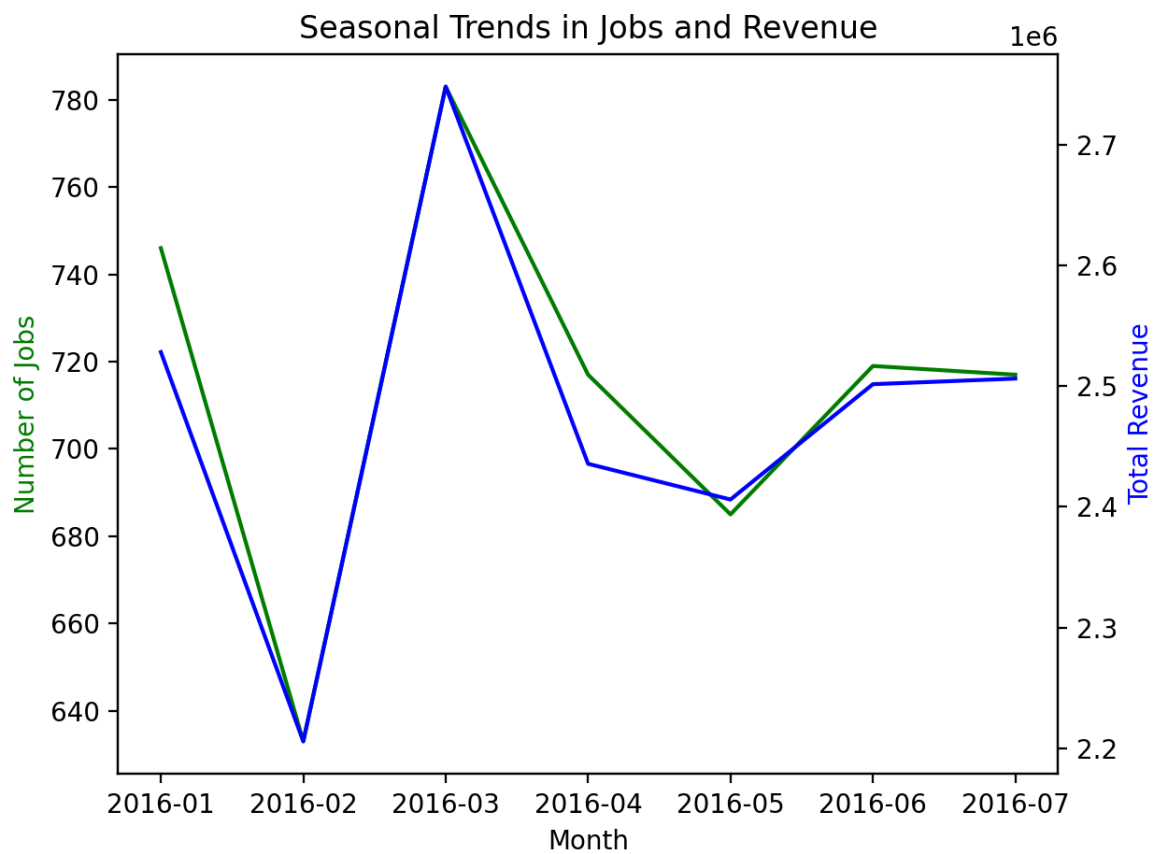
3.6 Response Rate Analysis

Table: Average Responses per Job by Profession

Profession	Avg. Responses
Painting	~6.5

Electricity	~6.0
Construction	~5.5
Windows and Doors	~5.0
Flooring	~4.5

3.7 Geographic Analysis (Can be explored)

- Top 5 locations by job volume and average order value

Heatmap of Job Volume by Location and Profession

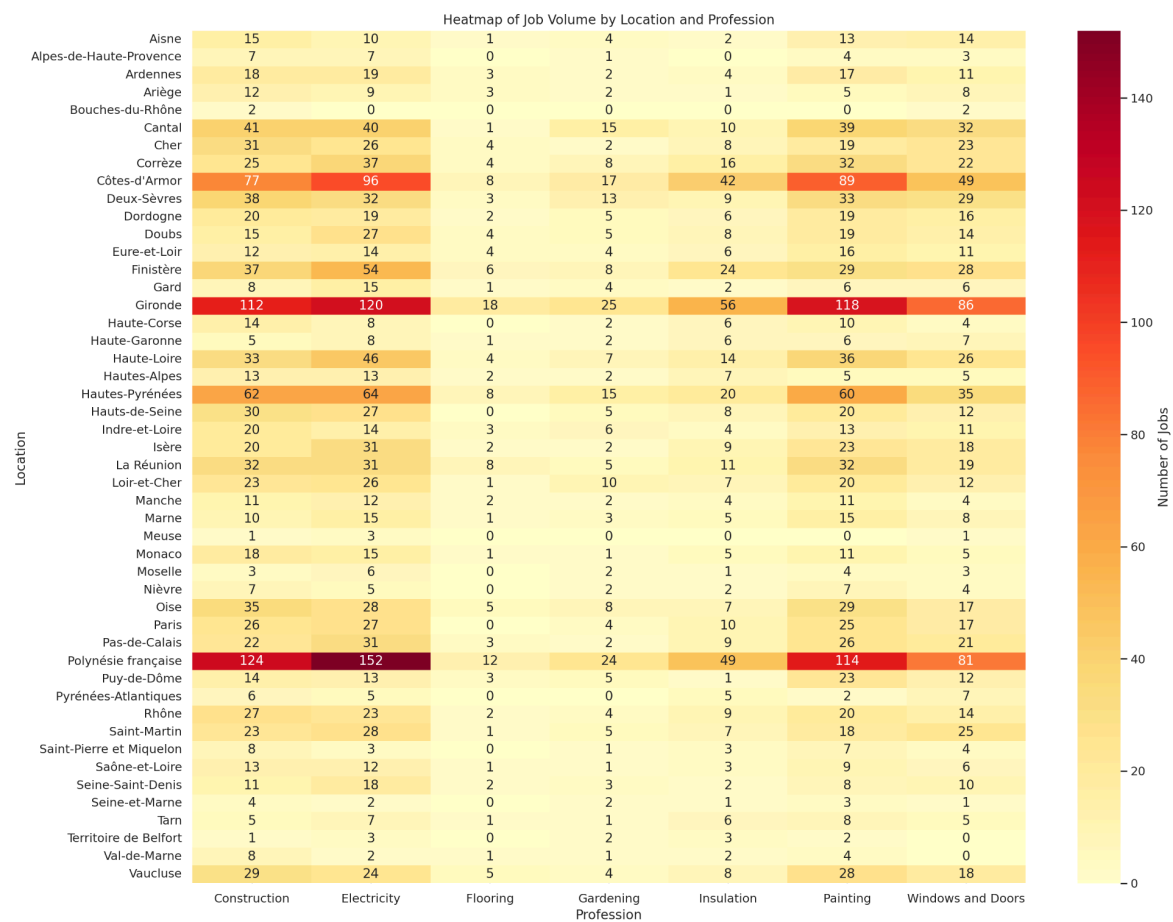| Location	Construction	Electricity	Flooring	Gardening	Insulation	Painting	Windows and Doors
Aisne	15	10	1	4	2	13	14
Alpes-de-Haute-Provence	7	7	0	1	0	4	3
Ardennes	18	19	3	2	4	17	11
Ariège	12	9	3	2	1	5	8
Bouches-du-Rhône	2	0	0	0	0	0	2
Cantal	41	40	1	15	10	39	32
Cher	31	26	4	2	8	19	23
Corrèze	25	37	4	8	16	32	22
Côtes-d'Armor	77	96	8	17	42	89	49
Deux-Sèvres	38	32	3	13	9	33	29
Dordogne	20	19	2	5	6	19	16
Doubs	15	27	4	5	8	19	14
Eure-et-Loir	12	14	4	4	6	16	11
Finistère	37	54	6	8	24	29	28
Gard	8	15	1	4	2	6	6
Gironde	112	120	18	25	56	118	86
Haute-Corse	14	8	0	2	6	10	4
Haute-Garonne	5	8	1	2	6	6	7
Haute-Loire	33	46	4	7	14	36	26
Hautes-Alpes	13	13	2	2	7	5	5
Hautes-Pyrénées	62	64	8	15	20	60	35
Hauts-de-Seine	30	27	0	5	8	20	12
Indre-et-Loire	20	14	3	6	4	13	11
Isère	20	31	2	2	9	23	18
La Réunion	32	31	8	5	11	32	19
Loir-et-Cher	23	26	1	10	7	20	12
Manche	11	12	2	2	4	11	4
Marne	10	15	1	3	5	15	8
Meuse	1	3	0	0	0	0	1
Monaco	18	15	1	1	5	11	5
Moselle	3	6	0	2	1	4	3
Nièvre	7	5	0	2	2	7	4
Oise	35	28	5	8	7	29	17
Paris	26	27	0	4	10	25	17
Pas-de-Calais	22	31	3	2	9	26	21
Polynésie française	124	152	12	24	49	114	81
Puy-de-Dôme	14	13	3	5	1	23	12
Pyrénées-Atlantiques	6	5	0	0	5	2	7
Rhône	27	23	2	4	9	20	14
Saint-Martin	23	28	1	5	7	18	25
Saint-Pierre et Miquelon	8	3	0	1	3	7	4
Saône-et-Loire	13	12	1	1	3	9	6
Seine-Saint-Denis	11	18	2	3	2	8	10
Seine-et-Marne	4	2	0	2	1	3	1
Tarn	5	7	1	1	6	8	5
Territoire de Belfort	1	3	0	2	3	2	0
Val-de-Marne	8	2	1	1	2	4	0
Vaucluse	29	24	5	4	8	28	18

Supply-Demand Ratio Heatmap by Location and Profession

| Location	Construction	Electricity	Flooring	Gardening	Insulation	Painting	Windows and Doors
Aisne	0.40	0.60	5.00	2.50	2.50	0.31	0.43
Alpes-de-Haute-Provence	0.14	0.29	0.00	1.00	0.00	0.25	0.33
Ardennes	0.28	0.58	0.67	2.50	2.00	0.82	0.64
Ariège	0.08	0.44	0.67	3.00	1.00	0.40	0.38
Bouches-du-Rhône	2.00	8.00	3.00	6.00	9.00	9.00	4.50
Cantal	0.51	0.75	11.00	1.47	1.30	0.64	0.91
Cher	0.10	0.15	0.75	3.00	0.38	0.47	0.13
Corrèze	0.28	0.43	2.00	1.38	0.25	0.50	0.68
Côtes-d'Armor	0.19	0.29	1.88	1.94	0.29	0.38	0.63
Deux-Sèvres	0.29	0.38	2.00	0.85	1.33	0.48	0.17
Dordogne	0.15	0.26	2.00	1.40	1.17	0.32	0.38
Doubs	0.40	0.37	0.75	1.20	0.62	0.74	0.43
Eure-et-Loir	0.08	0.21	0.75	1.75	0.17	0.50	0.45
Finistère	0.22	0.31	1.33	2.00	0.42	0.52	0.39
Gard	0.38	0.33	2.00	2.00	1.50	1.00	1.00
Gironde	0.26	0.31	1.44	1.20	0.27	0.31	0.45
Haute-Corse	0.50	0.75	3.00	4.50	0.33	1.20	2.00
Haute-Garonne	0.00	0.50	2.00	3.00	0.67	0.50	0.71
Haute-Loire	0.18	0.24	0.50	1.43	0.43	0.33	0.38
Hautes-Alpes	0.54	1.15	2.50	6.50	1.14	2.80	2.60
Hautes-Pyrénées	0.13	0.22	0.75	0.87	0.55	0.35	0.40
Hauts-de-Seine	0.13	0.07	7.00	2.20	0.38	0.70	0.67
Indre-et-Loire	0.30	0.57	1.33	1.50	1.25	1.15	0.64
Isère	0.20	0.16	0.50	3.00	0.56	0.30	0.17
La Réunion	0.25	0.48	1.38	4.60	1.45	0.69	0.58
Loir-et-Cher	0.26	0.31	3.00	0.70	0.86	0.55	0.67
Manche	0.09	0.00	0.50	1.50	0.00	0.09	1.50
Marne	0.20	0.33	5.00	1.33	0.20	0.60	0.62
Meuse	0.00	0.33	0.00	2.00	2.00	2.00	1.00
Monaco	0.00	0.00	1.00	5.00	0.20	0.45	0.80
Moselle	0.00	0.17	0.00	0.00	1.00	0.00	0.00
Nièvre	0.43	0.00	1.00	1.00	1.00	0.86	0.50
Oise	0.11	0.39	1.20	2.12	1.14	0.31	0.65
Paris	0.31	0.56	7.00	2.50	1.10	0.52	0.71
Pas-de-Calais	0.14	0.42	1.33	4.50	0.56	0.46	0.33
Polynésie française	0.15	0.22	1.33	1.54	0.47	0.35	0.49
Puy-de-Dôme	0.21	0.38	2.33	2.60	4.00	0.35	0.25
Pyrénées-Atlantiques	0.50	0.60	2.00	4.00	0.20	2.00	0.57
Rhône	0.30	0.48	2.50	3.25	0.78	0.75	0.71
Saint-Martin	0.09	0.21	11.00	2.20	0.86	0.56	0.36
Saint-Pierre et Miquelon	0.25	2.00	1.00	5.00	1.33	1.14	2.00
Saône-et-Loire	0.23	0.17	2.00	3.00	0.33	0.56	0.33
Seine-Saint-Denis	0.27	0.33	0.50	0.67	1.00	0.75	0.60
Seine-et-Marne	0.00	0.00	0.00	1.00	0.00	0.67	1.00
Tarn	0.40	0.14	1.00	5.00	0.17	0.00	0.60
Territoire de Belfort	1.00	0.67	0.00	0.50	0.00	0.50	1.00
Val-de-Marne	0.38	2.50	0.00	2.00	1.00	0.50	4.00
Vaucluse	0.03	0.29	0.80	2.00	0.50	0.18	0.67

This heatmap shows the supply-demand ratio for each profession across different locations. A ratio of 1 indicates perfect balance, less than 1 indicates undersupply, and greater than 1 indicates oversupply.

Recommendations:

- Construction and Electricity are significantly undersupplied (ratios of 0.28 and 0.59 respectively).
- Flooring and Gardening are oversupplied (ratios of 2.06 and 2.38 respectively).
- Insulation, Painting, and Windows and Doors are closer to balance but still slightly undersupplied.
- Focus on expanding services in high-demand areas
- Consider targeted marketing or recruitment efforts for underrepresented professions in specific locations, such as Windows and Doors in Location 3.

Additional Charts:

Job Composition by Profession Over Time
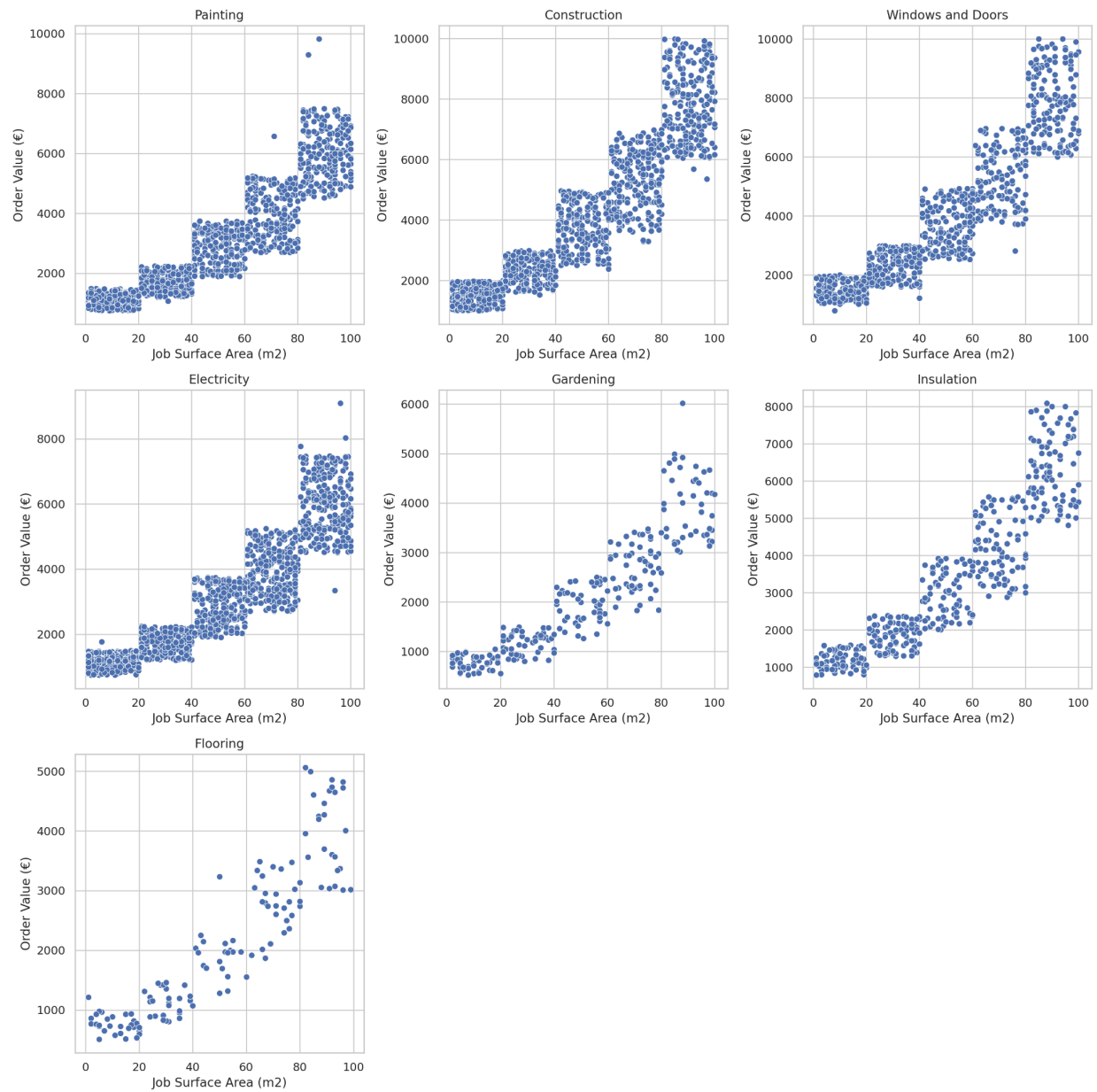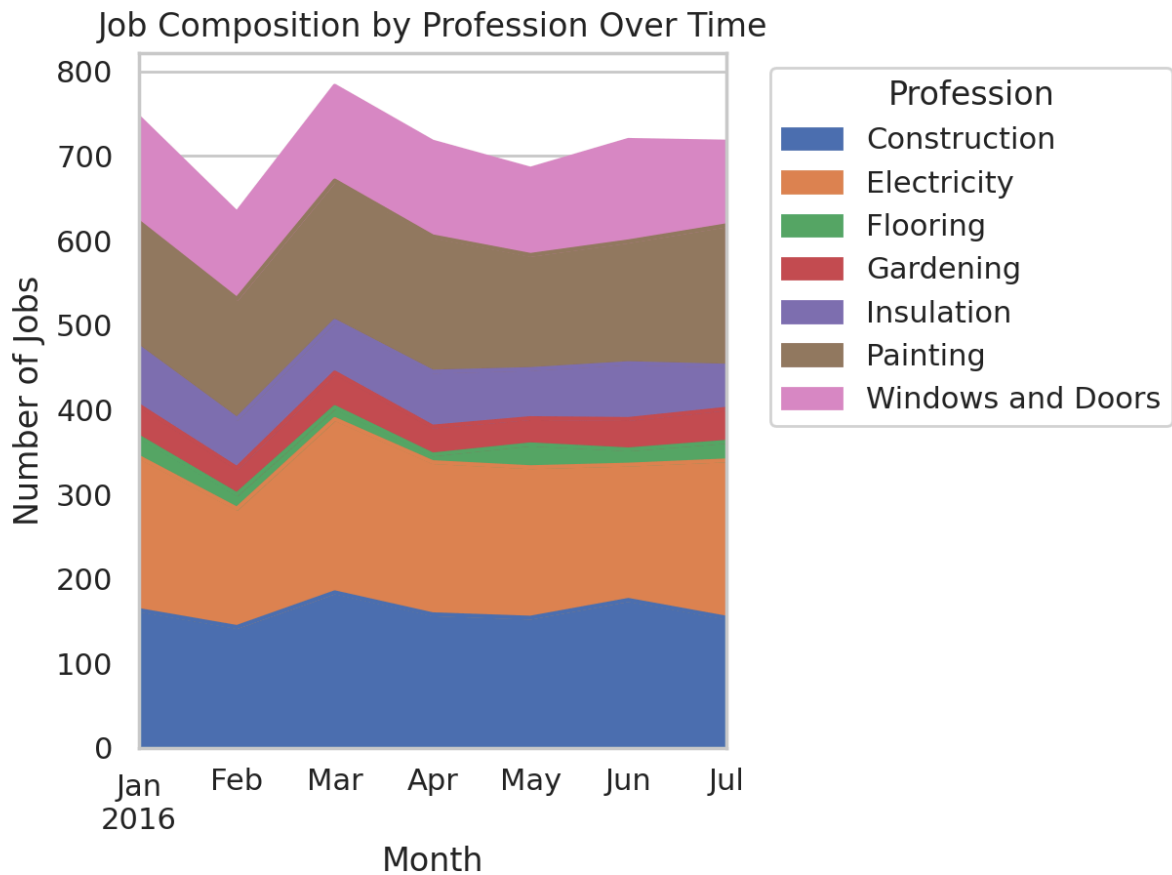
Recommendations:

- We can Analyze the factors contributing to the growth of certain professions (e.g., Electricity and Construction) and apply these insights to boost other categories.
- Prepare for seasonal fluctuations in demand for different professions, adjusting marketing and resource allocation accordingly.

Overall Strategic Recommendations:

1. Recruitment Drive: Launch a targeted recruitment campaign for tradespeople in underserved professions, especially Construction and Electricity.

2. Balanced Growth: While focusing on high-demand areas, also invest in growing the market for high-value but lower-volume professions like Insulation.

3. Geographical Expansion: Use the insights from the heatmap to guide expansion efforts into new locations, focusing on professions that are in high demand but underserved in specific areas.

4. Seasonal Preparedness: Develop strategies to manage seasonal fluctuations in job composition, such as flexible resource allocation or seasonal marketing campaigns.

5. Platform Optimization: Enhance the platform to better support high-volume professions while also improving visibility for niche or high-value services.

6. Customer Education: Develop content to educate customers about the value of various services, particularly for high-value professions with lower job volumes.

7. Dynamic Pricing: Consider implementing a dynamic pricing model that takes into account the supply-demand ratio for each profession, potentially increasing prices for underserved professions to attract more tradespeople.

4. Experiment Design (Question 2)

For a job matching platform, network effects can be present. The actions of one group (e.g., tradespeople or job posters) can influence the behavior of the other group, and these effects can propagate through the system. I therefore choose Switchback testing keeping these consideration in mind:

2. Switchback design:

Current Metrics: Current mean responses per job: 4.33

Current standard deviation: 1.42

Average number of jobs per day: 23.58

I will implement a switchback design, alternating between control and treatment conditions every few hours. This helps to control for time-based effects and network effects.

Here's the analysis using a switchback design:

3. Sample Size and Duration:

Using a more conservative approach due to potential correlation within switchback periods:

Required sample size (total): 294

Estimated experiment duration: 12.47 days

Assuming we switch between control and treatment every 4 hours (Assumption) :Total number of switches: 74

Minimum Detectable Effect: Minimum Detectable Effect: 8.12%

4 Interpretation and Recommendations:

1. **Sample Size**: We need a total of 294 jobs across both control and treatment groups to detect a significant effect.

2. **Duration**: The experiment should run for about 12.5 days.

3. **Switchbacks**: We'll have 74 switches between control and treatment over the course of the experiment. This frequent switching helps to distribute any time-based effects evenly between the two conditions.

4. **Minimum Detectable Effect**: We can detect an effect size of 8.12% or larger with 80% power.

   - Include time-based controls in the analysis to account for any trends over the course of the experiment.

   - Monitor the experiment closely, especially during the first few switchovers, to ensure everything is working as expected.

7. Additional Metrics:

   - Primary: Mean number of responses per job (as before)

   - Secondary: Time to first response, quality of matches (if measurable), user satisfaction for both job posters and tradespeople

By using this switchback design, we're better equipped to handle the network effects inherent in a job matching platform.

5. Final Thoughts

5.1 Insights:

1. Electricity, Construction, and Painting are the most in-demand services
2. Construction and Windows and Doors generate the highest average order values
3. Strong correlation between job size and order value
4. Some professions show significant supply-demand mismatches
5. Clear seasonal trends in job numbers and revenue

5.2 Recommendations:

1. Focus recruitment efforts on high-demand, high-value professions (e.g., Construction, Electricity)
2. Develop strategies to attract and manage larger projects
3. Implement seasonal marketing campaigns to balance demand during low seasons
4. Introduce incentives to encourage more responses per job, especially in professions with lower average responses
5. Optimize the platform to effectively handle and price the wide range of job sizes
6. Analyze success factors of high-value professions and apply insights to others
7. Investigate and improve the value proposition for lower-value professions to increase their average order value

---

End of Doc.

Thanks

Author: Aditya Yadav