

# Technology shift impacts on the recruitment management triangle

Technology  
shift impacts  
on recruitment

Evan Shellshear

*The University of Queensland, Brisbane, Australia, and*

Kah Wee Oh

*Ubidy, Brisbane, Australia*

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## Abstract

**Purpose** – This paper investigates the constraints an organisation faces when using recruitment agencies and having to trade-off between the speed of hiring a candidate, the cost of a candidate and the match of the candidate against the job requirements across different job seniorities. We analyse how technology can shift the cost and hiring speed in spite of these constraints.

**Design/methodology/approach** – The research design is exploratory, quantitative and cross-sectional. The study employed a two-factor, unbalanced class Analysis of Variance (ANOVA) including interaction effects to test the difference between the means of the class of interest and a control class.

**Findings** – Our empirical findings confirm that (1) the technological innovation of a recruitment agency marketplace can liberate organisations from their time, cost and quality hiring constraints, accelerating the time to hire by four times and reducing costs by over 12%, and (2) these results hold across varying role seniority levels.

**Originality/value** – This study contributes to the existing literature in three ways: (1) it introduces the recruitment triangle from project management into the recruitment literature; (2) it demonstrates how technological innovations such as recruitment agency marketplaces are able to provide a shift in the constraints posed by the recruitment triangle.

**Keywords** Recruitment triangle, Talent sourcing, Talent acquisition, Recruitment, Recruitment constraints

**Paper type** Research paper

## Introduction

The world of HR has gone through significant challenges over the last four years. Beginning with a strong market, companies were negatively affected when the coronavirus disease 2019 (COVID-19) pandemic shut down almost all hiring activities. As the pandemic impact waned, certain industries such as software and digital technology experienced a hiring boom, leading to tighter labour markets (Kiss *et al.*, 2022; Krumel *et al.*, 2021), where it was difficult to find skilled employees. High labour demand, as well as what some termed “the Great Resignation” where employees resigned from their jobs at unprecedented rates (Amanor-Boadu, 2022; Tessema *et al.*, 2022; Krumel *et al.*, 2021), and a less positive business outlook driven by economic challenges globally, including inflation and rising interest rates (Ferber, 2023) put further pressure on recruitment teams.

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To tackle these challenges, many employers are looking to internal and external data sets, new tools and technologies, and innovative ways of hiring to fill labour shortages without increasing recruitment budgets. For small- to medium-sized businesses without well-developed Human Resources Management divisions, hiring technologies present a powerful option to supplement limited recruitment resources.

Talent acquisition has always been an essential part of a firm's operations (see, e.g. [Barney et al., 2001](#); [Lockett et al., 2009](#) for a resource-based view of the firm), and even more so in light of the aforementioned challenges. As stated by [Randhawa \(2017, p. 1\)](#), the success of an organisation is not shown only through their profits, but intellectual capital has become a major contributor to the value of the company. In addition, [Mohapatra \(2020, p. 1\)](#), states that "talent acquisition has emerged as a key business imperative for organisations for its role in sourcing the right talent to ensure long term growth". To address these strategic imperatives, organisations may turn to labour market intermediaries, such as executive search firms and recruitment agencies to assist with talent acquisition, particularly in tight labour markets and where global sourcing of talent is required ([Bonet et al., 2013](#)).

Using recruitment agencies to source talent is not a silver bullet, and talent acquisition using recruitment agencies is also subject to challenges and constraints. [Shellshear \(2023\)](#) draws from project management literature to elucidate these challenges as a triple constraint to HR. In project management, the "iron triangle" or "triple constraint" ([Pollack et al., 2018](#)) represents the relationships between the key performance criteria of cost, time and scope, and is used to explain how the outcome of a project is constrained by the project's budget, deadlines and scope (features/quality). Project managers must trade between these three constraints as changes in one constraint necessitate compensatory changes in others. For example, a project manager cannot single-handedly increase the project's scope without influencing the budget or deadline ([Pollack et al., 2018](#)).

In summary, these principles explain the trade-offs that occur when managing projects, namely:

- (1) Time: A project can be completed faster by increasing budget or cutting scope (or quality).
- (2) Scope: Increasing scope may require increases in budget and schedule.
- (3) Cost: Cutting the budget without adjusting the schedule or scope will lead to lower quality.

These three elements (time, scope and cost) are always in tension ([Wright and Lawlor-Wright, 2018](#)).

This study conceptualises talent acquisition as an organisational project that must be managed and applies the triple constraint concept to hiring through a recruitment agency. In recruiting new employees, organisations must understand the trade-off between three key analogous factors when sourcing talent via a recruitment agency:

- (1) The cost of hiring
- (2) The timeline for hiring
- (3) The candidate requirements (i.e. the experience, skills or knowledge required of the candidate)

We claim that these three factors are also in tension for recruiters. Conceptualising the recruitment of a suitable candidate as a project, the organisation's recruiter (analogous to the project manager) is required to hire a candidate by a certain timeline (i.e. complete a project to hire someone). They have a budget that they are allowed to spend on a recruitment agency (in

other scenarios they may use a job board with a likely smaller budget), and the candidate must fulfil certain requirements (analogous to the scope) usually in the form of experience, specialisation or skill requirements. These three criteria (cost, time and candidate requirements) thus form a fundamental recruitment management triangle - a three-way set of constraints. This study aims to demonstrate that these constraints hold for recruiters when engaging individual recruitment agencies, and how the use of an agency recruitment marketplace (we use the term recruitment agency marketplace and agency recruitment marketplace interchangeably without any difference in meaning, which is provided below) can somewhat liberate recruiters of the trade-offs and mitigate recruitment risks for organisations.

For example, previously, to fill a vacant position, an organisation might have had to choose between:

- (1) A higher fee of say up to 18% per candidate for a fast candidate search that matches the requirements
- (2) Up to a 3-month search for a lower fee and a good match
- (3) Potentially only a 50% match with the requirements to find the candidate quickly for a low cost

Now, new technologies in the form of agency recruitment marketplaces can reduce costs and time, while increasing candidate quality, to minimise trade-offs and shift the equilibrium to a better outcome:

- (1) A fee of perhaps only 14% for a fast candidate search that matches the requirements
- (2) Up to a 2-month search for a lower fee and a good match
- (3) A 70% match with the requirements to find the candidate quickly for a low cost

Practically, this means organisations can hire better matching candidates, faster for less cost. To date, however, there is limited empirical data that demonstrate how these trade-offs occur in a recruitment context and less exploration of how to mitigate them.

This paper demonstrates the critical importance of triple constraints in talent acquisition, and how technology-enabled recruitment agency marketplaces are able to liberate the fixed trade-offs in a given situation. Using data from a recruitment agency marketplace, Ubidity, we quantify the most important factors a recruiter will face and show how technology can provide fundamental shifts in the relationship between these factors. We do this via a two-factor, unbalanced class Analysis of Variance (ANOVA), a technique used to analyse the difference between means with interaction effects (Shaw and Mitchell-Olds, 1993), to prove statistically significant differences in the means between the results of the recruitment agency marketplace and a representative recruitment agency. The findings show the ability of technology to shift the constraints of the recruitment management triangle.

The findings demonstrate how an organisation may achieve a step change in the recruitment function, improving all three factors at once, a feat normally impossible when focusing on existing recruitment methods. Currently, talent acquisition teams are required to trade-off between the three factors without being able to shift all of them at once in a beneficial direction. This article presents the first critical step in quantifying these relationships by analysing how each dimension individually moves as a technology shift occurs.

## Literature review and research hypotheses

### *The iron triangle in project management*

The recruitment management triangle concept presented in this paper draws from the concept of the iron triangle, which has been long applied in project management

(Pollack *et al.*, 2018; Caccamese and Bragantini, 2013). Project managers are constantly having to work within trade-offs between timelines, cost, scope and quality (and more). Much research has addressed the challenges of balancing, optimising and modelling these three factors to produce the best outcome (see, e.g. Wright and Lawlor-Wright, 2018; Zid *et al.*, 2020).

The project management literature is rich with analyses covering the theoretical aspects of the project management triangle as well as techniques to optimise it. For example, Banihashemi *et al.* (2021) analysed the known time–cost–quality trade-off in the construction industry using a fuzzy multi-criteria decision-making method to choose the best mode for performing each activity. Given the set of constraints, these authors showed how this allows a company to choose an outcome optimal to the company balancing the constraints.

Returning to a focus on resource management, Shojaee *et al.* (2022) attack the project scheduling problem in the construction industry, considering multi-skilled resource and labour competency. The authors create an integrated multi-objective optimisation model of project scheduling and human resource assignment including total completion time, execution cost minimisation and project quality maximisation. They solve this problem exactly using a mixed-integer programming model as well as with a non-dominated sorting genetic algorithm. While this study integrated skills and human resources as a project constraint, the focus was on project scheduling and not on talent acquisition via recruitment agencies. How triple constraints (the iron triangle) apply to projects for the acquisition of talent is a novel concept, only recently explored (Shellshear, 2023).

#### *Talent acquisition*

While there is a significant body of human resource management literature on recruitment and selection, talent management and talent acquisition (see, e.g. Walford-Wright and Scott-Jackson, 2018; Parthasarathy and Pingle, 2014; Jose, 2019), there is very little focus on the challenges associated with acquiring talent and modelling the approaches taken by recruitment agencies (or in-house recruiters or others) to talent acquisition. A few studies such as Pal and Misra (2021) look at the talent acquisition challenge in India which arises due to the large number of possible candidates to engage. The paper takes a practical perspective analysing the talent acquisition processes at ITC Sonar and ITC Royal Bengal and identifying the extent of effectiveness of different talent acquisition methods in the recruitment of employees. The paper focused on the channels of recruitment and satisfaction levels of candidates rather than the trade-offs and constraints experienced by recruiters.

The constraints of cost, quality and time (or efficiency) are acknowledged in a study by Deshpande *et al.* (2007). These authors develop a system called iTAG to analyse past talent acquisition data using statistical analysis techniques and to discover novel patterns/insights which can help in improving the cost, efficiency and quality of recruitment. Although the system could, in theory, answer the types of questions posed in this article, its focus lies on creating a set of key performance indicators (KPIs) that can be used to monitor talent acquisition success. The trade-offs between constraints require further consideration.

In the article by Boudreau and Ramstad (2001), the authors take a different direction and argue to move away from the mechanical and quantitative measures of the volume of applicants or new hires, or the costs and time involved in new staffing activities. The article argues to look beyond the actual act of hiring, to things like the quality of the hire after being in the firm and encourages readers to take a holistic decision-making framework approach and to capture a realistic measure of success when hiring. This paper is related to the work presented here although its context is much larger and doesn't focus on the specifics addressed here.

### *Recruitment management constraints*

There is a limited body of research on the constraints facing employers using recruitment agencies; however, a few studies point to the idea that trade-offs exist in talent acquisition, particularly when a recruitment agency is involved. For example, [Gerchak and Golany \(2000\)](#), p. 202, “analyse the trade-offs involved in hiring workers, primarily through external agencies, aiming at balancing hiring cost and expected contribution by workers”. Although this article highlights a trade-off or balancing of competing tensions and identifies the cost of the agency as one of those factors, the article focuses on the actions of the agencies and their impact on the mathematically optimal mix of agency usage by a firm and not on a specific job requisition.

More recently, [Shellshear \(2023\)](#) specifically proposes the application of the triple constraints from project management to recruitment to model the challenges recruiters face when carrying out hiring projects and so introduces the concept of the recruitment management triangle as the equivalent of the triple constraint to the recruitment literature. This short article did not go beyond the introduction of the concept to test its assumptions in real life as we do here.

Taking a similar empirical and project management approach to this current study, [Moheb-Alizadeh and Handfield \(2017\)](#) consider talent acquisition from a supply perspective. They analyse a resource acquisition problem from a typical supply chain lens, where an organisation recruits for multiple roles given a limited pool of potential candidates acquired through a limited number of recruiting channels. The authors develop a multi-period mixed-integer nonlinear programming model and empirically validate the model with a large global manufacturing company to demonstrate how the proposed model can effectively manage hiring in a practical context. Although similarities to this paper may be apparent, the approach doesn't focus on the trade-off of the constraints faced here and focuses more on the delivery of talent from fixed channels and how to balance the trade-offs between channels to achieve hiring targets based on fixed inputs.

### *Research hypotheses*

Prior research has considered aspects of the recruitment challenges discussed here including the use of recruitment agencies, time, cost and quality of hire; however, this paper combines these concepts and adopts a project management lens to undertake the first empirical analysis of the cost-time-quality framework in talent acquisition undertaken through recruitment agencies. Further, this study demonstrates how technological innovations in recruitment can shift the constraints facing recruitment teams.

We propose and demonstrate the following:

- (1) The recruitment triangle exists (by demonstrating it for a single agency).
- (2) Technological innovations such as recruitment agency marketplaces can have an impact on shifting the trade-offs between these constraints.

For point two, our specific research hypotheses are as follows. We present the null hypothesis in each case and carry out analysis later on to either reject the null hypothesis (based on some level of statistical significance) or show that we are unable to reject it (based on some level of statistical significance):

- H1.* The candidate acquisition costs for agency hiring via a single agency and recruitment agency marketplaces are the same for a given candidate quality.
- H2.* The speed of candidate submission for agency hiring via a single agency and recruitment agency marketplaces is the same for a given candidate quality.

As the literature review shows, the rejection or non-rejection of both hypotheses is not clearly demonstrated from previous studies, especially in light of technology like a recruitment agency marketplace for which no previous literature exists, according to the knowledge of the authors. Also as the literature review shows, the result of testing these hypotheses will answer key challenges facing talent acquisition teams.

## Method

In the global recruitment agency landscape, over the last decade, a new platform has arisen that has the potential to disrupt current constraints to hiring through recruitment agencies. This platform is called a recruitment agency marketplace. A recruitment agency marketplace is typically an online digital platform, where agencies and employers register to work together (similar to the Uber or AirBnB type of model but B2B). Employers post a job requisition to be filled and the recruitment agency marketplace will typically automatically connect this job requisition with recruitment agencies able to fill the role. Currently, there exist a number of such platforms operating in specific countries around the globe (such as Ubidity, HiringHub, TalentVine, GoScoutGo, Recruitifi and others). These platforms enable access to a wider talent pool for less effort and can also reduce the time to source the right agency by algorithmically selecting agencies based on job requirements and past performance. We will show here that they also allow recruiters to liberate themselves somewhat from the triple constraint faced while hiring.

To quantify our work, we leveraged anonymised data from the Ubidity recruitment agency marketplace (<https://ubidy.com/>). The Ubidity agency recruitment marketplace platform allowed us to anonymously aggregate data across many employers in many regions to understand what performance shift a technology such as Ubidity can provide for an individual employer.

The Ubidity platform, founded in 2016, has since worked with over 50 companies (employers), onboarded over 600 agencies, supported over 2,000 jobs and processed over 30,000 CVs through the platform for these jobs. In any given month, around 50–100 agencies will be active on the platform. The companies have been based over the globe with a focus on North America, Asia Pacific and the Middle East. Companies from Europe, Africa and other parts of the world have been or are active on the Ubidity platform; however, they account for less than 5% of the total jobs posted by companies. The employers typically come from the engineering, resources (oil and gas, mining, etc.), construction and transport industries with the majority being in the resources sector.

Agencies on Ubidity come from all over the world with 42% being based in Asia and Pacific, 29% in Europe and the Middle East and 28% in North America. The remaining agencies come from other parts of the world. It must be noted that the location of a recruitment agency is not a direct indicator of the markets it serves. Most agencies source candidates from countries other than where they are located.

This study undertakes a quantitative statistical analysis to compare the constraints within the recruitment management triangle (time, cost and quality) experienced by one employer when using an individual agency, and when using the Ubidity platform (multiple agencies). We first:

- (1) Examine the data on time and cost for a fixed quality, for a single anonymous and representative agency servicing a single anonymous employer.
- (2) Compare this agency's results against the entire Ubidity platform's agency panel's results for the same employer.

This information is then used to reject or not reject our two research hypotheses.

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### *Data collection methodology*

As mentioned previously, the data collected for the analysis were extracted from the Ubidity platform. It was extracted as a CSV flat file via an SQL query. The period over which the data was extracted was from January 2018 until June 2023.

The data extracted from the Ubidity platform contained information on (columns):

- (1) Candidate First Name
- (2) Candidate Last Name
- (3) Agency Name
- (4) Agency Bid Value
- (5) Date a job was posted on the platform
- (6) Date Interviewed
- (7) Date CV submitted by a given agency
- (8) Role (or job) seniority

Each row in the exported flat file is a candidate submitted against a job posted on the platform. These variables were then transformed into a number of intermediate variables such as the difference in time between the date a job was posted on the platform and the date a CV was submitted to determine some of the variables used below such as the days to first interviewed candidate submitted by an agency. The role seniority and agency bid level used below come directly from the exported data.

After exporting the data and carrying out the above calculations, our approach to generate and filter the data was as follows:

- (1) For each job listed on the Ubidity platform by the chosen employer, for all the candidates on the Ubidity platform for that job we selected the fastest-placed candidate (irrespective of agency supplier) that made it to the interview stage as well as its bid by the agency.
- (2) For that job listed on the Ubidity platform, for the chosen comparison agency, we selected the fastest submitted candidate from that agency who made it to the interview stage as well as the bid by this chosen comparison agency only.

We choose only candidates that make it to the interview stage to ensure quality, i.e. that the candidate submitted is suitable for the role (according to the employer). It is easy for an agency to submit any candidate quickly for next to no cost; however, this candidate may not be suitable for the role at all. Hence, all candidates used in this analysis must make it to the interview stage to be considered for the analysis. This ensured a fair comparison of the submitted candidates. For reference, the stages on the Ubidity platform are:

- (1) New
- (2) Shortlisted
- (3) Screening
- (4) Interviewed
- (5) Offer extended
- (6) Hired
- (7) Not selected

Out of all the employers on the platform, we selected a single representative employer to analyse our hypotheses for which there exists enough data across a variety of roles and agencies. The chosen employer operates in the resources sector and the roles being filled were a variety across the organisation to assist with the different projects being undertaken. This employer was chosen as they were of a similar size as other employers (with tens of thousands of employees), worked in the most common sector for employers on the Ubidy platform (resources) and fulfilled roles across all parts of the business (legal, financial, accounting, operational, HR, etc.). In addition, there was enough data on this employer for the results to be statistically significant.

We reviewed all the agencies servicing this anonymous employer, located around the world, and chose a given agency for comparison. This agency was selected due to it representing the most common type of active agency: located in the second largest agency market, Europe and the Middle East, and being one of the weekly active agencies on the platform. Additionally, candidates interviewed from CVs submitted on the platform by this agency provided enough data to draw statistically significant conclusions. We considered other agencies, and although we did not find statistically significant results, they were directionally similar results to this agency, indicating the representativeness of this agency and our results.

To develop our model, cost (or the fee paid to the agency, which we synonymously call a “bid” below) and time to submission of the CV were used as the cost and time parameters discussed in the recruitment triangle constraints above. The bid values were taken directly from the extracted data, the time was computed as mentioned above (i.e., the difference between the date a job was posted on the platform and the date a CV submitted by a given agency that then later made it to the interview stage, as described above) and the role seniority was also taken directly from the platform. We used role seniority as our proxy for the role requirements (i.e. quality/scope) criterion. As the role seniority increases, the role becomes more demanding to fill, with the most demanding being the highest possible value (in our case this was 10 and fractional values were possible). This then corresponds to our quality criterion of fit with role requirements as the more senior the role, the more demanding the requirements and so candidates who fulfill lower role requirements may not fit higher seniority, justifying seniority as our choice for the proxy for the job requirements.

For all the data used in the above approach, the employers and agencies in their agreement with Ubidy allow the platform to collect anonymised data for aggregated analysis such as that done here in this paper. The collected data were analysed using the Python programming language (Beazley, 2009) to carry out the ANOVA analysis.

### Data analysis and results

To ensure consistency in the analysis with respect to role seniority, we analysed the chosen agency working with the selected employer and presented the results for the individual agency below, compared to Ubidy (Table 1). Table 2 presents the results of bid level (cost) by seniority for the chosen agency compared with the Ubidy platform.

**Table 1.**  
Analysis of the average time for Ubidy versus the average time for the comparison agency to submit an interviewed candidate as a function of seniority level

Seniority	Agency days to first interviewed candidate	Agency std. deviation	Ubidy days to first interviewed candidate	Ubidy std. deviation
4	54	10	13	8.5
6.5	24	20	6	14
7	61	14	8	18

**Source(s):** Table by authors

We then conducted an ANOVA analysis making three assumptions about the data:

- (1) The observations are independent. Because we are only considering the first interview-ready candidate from each agency and each role analysed with our data is different, we can take this assumption as having been fulfilled.
- (2) The observations are normally distributed. The fulfillment of this criteria is not perfect with some of the data being skewed although not badly. The observations of the agency-dependent variable (time to first candidate) skewness is  $-0.7$  and for the Ubidy platform it is  $2$ . The higher skewness of the Ubidy platform attributable to the impossibility of providing a candidate in less than 1 day, thereby positively skewing the data.
- (3) The final assumption is that the variances are the same. The variances between the agencies did differ, although they were similar enough to not raise concern. Proper testing could be carried out using Levene's test or the Brown-Forsythe test.

Of these three assumptions, the most important is the first which the data fulfills.

To validate and confirm that the Ubidy platform demonstrated superior performance, we analysed:

- (1) The average time for Ubidy versus the average time for a given agency across all seniority levels and bid (cost) levels, i.e. just a plain average. We analysed this using a two-factor, unbalanced class ANOVA including interaction effects.
- (2) The average time for Ubidy versus the average times for the same given agency in 1, as a function of seniority level.
- (3) The average bid across as a function of seniority level for Ubidy versus a given agency.

We did not analyse the effect of bid level on the average time for a given agency to deliver the first candidate as the results were too variable and clear conclusions could not be drawn (even with a regression line fit to the data controlling for things like agency, seniority, etc. the standard errors were too great to draw sensible conclusions).

For our analysis, we had 14 job postings where both the agency posted a candidate that achieved the interview stage (and clearly the Ubidy platform did too).

We took these 28 data points (14 for each "agency" - the comparison one and the Ubidy platform) and carried out the aforementioned ANOVA analysis on the time taken to submit the candidate based on the level of seniority and the "agency" (either by Ubidy or the given agency). The results are presented in the ANOVA Table 3 below (Seniority:Agency is the Seniority and Agency interaction effect,  $df$  stands for degrees of freedom,  $F$  is the  $F$ -value (or  $F$ -statistic) and  $Pr(>F)$  stands for the probability of this  $F$ -value occurring):

Seniority	Agency average bid level USD	Agency std. deviation	Ubidy average bid level USD	Ubidy std. deviation
4	\$12,000	\$2,800	\$11,000	\$1,400
6.5	\$13,000	\$710	\$12,300	\$1,700
7	\$14,000	\$0	\$11,500	\$1,500

Source(s): Table by authors

**Table 2.**  
Analysis of the average bid for Ubidy versus the average bid for the comparison agency to submit an interviewed candidate as a function of seniority level

In this case, for the chosen comparison agency, the mean time to first interviewed candidate was 47 days and for the Ubidy platform, it was 11.6 days. From our ANOVA analysis, we see that this time difference is statistically significant ( $p < 0.01$ ) for the agency factor. With this result, we can reject the first null hypothesis with an alpha equal to 0.01.

We then also carried out the analysis for the dependence of the bid on the agency and role seniority (with the meanings being as in the above Table 4):

In this case for the chosen agency, the mean candidate bid was \$13,357 and for the Ubidy platform, it was \$11,678. This bid difference is statistically significant ( $p < 0.05$ ) for the agency factor. With this result, we can reject the second null hypothesis with an alpha equal to 0.05.

**Discussion**

The results of our analysis present a number of striking conclusions (with statistical significance) for the employing organisation:

- (1) The usage of a recruitment agency marketplace such as Ubidy increases the speed of delivery of interview-ready candidates by a factor of four or more.
- (2) The usage of a recruitment agency marketplace such as Ubidy reduces the fees paid for candidates by 12.5%.

Due to their statistical significance, these two results allow us to reject Hypothesis 1 and Hypothesis 2 stated above and show that for a given candidate quality (seniority), the candidate acquisition costs for agency hiring via a single agency is typically higher than hiring a candidate via a recruitment agency marketplace. In addition, the results show that for a given candidate quality (seniority), the speed of candidate submission for agency hiring via a single agency is not as quick as hiring a candidate via a recruitment agency marketplace.

These results validate that a technology shift caused by a recruitment agency marketplace is able to break the constraints of the iron triangle in the recruitment context, allowing a recruitment manager to improve performance on a given variable without having to forgo performance on another variable.

**Table 3.**  
Analysis of agency and seniority with respect to time taken to submit an interviewed candidate

	df	Sum squares	Mean squares	F	Pr(>F)
Seniority	2	1,346	673	2.80	0.082
Agency	1	8,786	8,786	36.62	0.000004
Seniority:Agency	2	2,955	1,478	6.16	0.0075
Residual	22	5,277	240	N/A	N/A

**Source(s):** Table by authors

**Table 4.**  
Analysis of agency and seniority with respect to the fee for an interviewed candidate

	df	Sum squares	Mean squares	F	Pr(>F)
Seniority	2	4,860,000	2,430,000	0.83	0.45
Agency	1	19,700,000	19,700,000	6.78	0.016
Seniority:Agency	2	5,640,000	2,820,000	0.97	0.39
Residual	22	64,000,000	2,910,000	N/A	N/A

**Source(s):** Table by authors

The ANOVA analysis also shows that the interaction effect of seniority and agency plays a role and as the seniority increases (i.e. the roles become harder to fill) the Ubidy platform further increases its performance advantage over the single comparison agency (refer [Table 3](#) and [Table 4](#)).

Further corroborating this is the interesting result that for the Ubidy platform the speed of delivery of interview-ready candidates and fees paid for candidates are not dependent on the seniority of the candidate ([Table 1](#)). In fact, looking across the seniority levels, the average results hold with a similar conclusion, i.e. for all seniority levels there is at least a factor of four improvement in the speed of delivering an interview-ready candidate with the highest seniority level seeing a seven times improvement.

In relation to cost ([Table 2](#)), as seniority increases the fee requested by our chosen recruitment agency also increases. However, for the Ubidy platform, as with the speed of delivery of an interview-ready candidate, the data indicate that the performance of the platform with respect to the bid level (cost) is independent of the seniority. This is an incredible result and were it to extend further it would represent a true violation of the triple constraint via technology, providing a competitive advantage for any organisation using a recruitment agency marketplace. Senior hires are usually the most expensive for an organisation and so any cost advantage, without a concomitant loss of timeliness or capability (i.e. job requirements) presents a significant improvement on the limitations of current recruitment approaches.

#### *Academic implications*

This study contributes to the literature on talent acquisition and recruitment through the novel application of the project management theory of triple constraints or the iron triangle, to propose the new concept of a recruitment management triangle. This framework provides a new way of understanding the challenges facing recruitment teams. The results confirm that the recruitment management triangle exists and that innovations in recruitment are able to shift the constraints (variables) in favour of the recruiter in a statistically significant way. The results here have demonstrated an improvement of a practically important magnitude that gives rise to the academically important question of how big an improvement is possible.

Future research is needed to determine if other types of technologies or agency models, or using a combination of technologies could also lead to shifts in the constraints of the recruitment management triangle. This approach and analysis presented here may also provide insights into use in project management and the constraints imposed by the iron triangle there.

#### *Practical implications*

The practical implications of this study are significant. As an example, for a large organisation with 1,000 candidates to hire through a recruitment agency, if we assume an average agency fee of \$15,000 USD the results of this study suggest that a recruitment agency marketplace like Ubidy could lead to savings of over \$1.8 million USD while simultaneously hiring candidates four times faster. Future research is needed using other example agencies to confirm the generalisability of these results.

For recruitment professionals working with recruitment agencies to hire suitable candidates, this study clearly demonstrates the benefits of technologies to practitioners in gaining a competitive advantage by hiring faster at a lower price and improving trade-offs. In addition, by quantitatively exploring the relationship between the variables of the iron triangle for individual organisations, companies will be able to benchmark their performance against that of other organisations.

For recruitment agencies, the competition created by the many recruitment agencies could lead to lower profits on individual roles; however, overall the authors suspect that the simple access to many new roles outweighs the lost revenues and the efficiency gained in agencies being able to avoid sales, legal and procurement costs would also balance any lost revenue.

These results also suggest that potential inefficiencies may exist with preferred supplier agreements between agencies and employers. Agencies often seek to sign exclusive agreements with employers (as a part of a preferred supplier agreement) and the analysis presented here demonstrates the possible inefficiencies that can arise out of such contracts. We propose that the digital marketplace structure (possibly driven by the greater competition) enables a more efficient outcome on both sides of the market because the aggregation of more agencies enables a more efficient approach to filling roles better suited to their particular capabilities (i.e. their competitive advantage, similar to the concept of a country's comparative advantage).

### **Conclusion**

This study provides decision-makers in recruitment teams with a framework to understand the tensions that exist when aiming to achieve a year's hiring goals, on budget and with the right candidates.

To develop our results, we carried out a two-factor, unbalanced class ANOVA including interaction effects to test the difference between the means of the class of interest and a control class using anonymised data from the Ubidity platform.

The results presented here demonstrate the clear advantage that a technology shift can create by allowing a company's talent acquisition team to break through the three-way constraint of time, cost and candidate quality, the so-called recruitment management triangle concept that we introduced here.

The statistically significant benefits created by the agency recruitment marketplace are quite impressive, showing a greater than four times benefit in speed of delivery of interview-ready candidate and over 12% improvement on the cost to acquire a qualified candidate when compared to a representative agency. These results hold across varying role seniority levels too.

For a large organisation, these benefits are significant and a real competitive advantage and provide guidance as to a new way to engage recruitment agencies to improve talent sourcing outcomes without having to sacrifice time, cost or quality outcomes.

### **Limitations and future work**

The utility of the analysis could be increased by rerunning it focusing on a specific industry, specific candidate source countries, specific agency country office location, employer target countries, etc. It would also be insightful to apply this analysis on a department-by-department basis focusing on each of the specific areas within a single company.

In addition, our analysis only looked at the first candidate that made it to the interview stage. Other candidates could have been considered which may have changed the analysis (although here the maximum fee paid by the employer was fixed so later candidates would not have added anything to the analysis presented here).

This analysis has been done on the data from Ubidity's recruitment agency marketplace and results may vary between organisations. Each organisation should do this same analysis on their own data examining the results they achieve when using a recruitment agency marketplace. Future analyses should be undertaken to validate these results.

Finally, the quality of the candidate post-hiring has not been assessed in this study. This would require further post-hiring data which was not available through the Ubidity recruitment agency marketplace.

Future studies could expand this analysis across many more agencies, possibly other recruitment agency marketplaces and also other industries. This will help demonstrate the external validity of the results for other organisations not using the Ubidity platform or operating in the resources sector. Future publications could also look at mathematically defining the relationship between the variables from first principles.

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**Corresponding author**

Evan Shellshear can be contacted at: [e.shellshear@business.uq.edu.au](mailto:e.shellshear@business.uq.edu.au)

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