

# Business Analytics Capability and its Effects on Supervisory Effectiveness among Early Career Professionals

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## Abstract

This study examined the extent of business analytics capability (BAC) and its effects on the supervisory effectiveness of early career professionals in three analytics-adopting companies in Metro Manila, coded as Company A, Company B, and Company C. It used a descriptive-correlational design under the quantitative research method with 832 supervisors aged 18 to 40, selected through stratified random sampling based on the Raosoft sample of each company. A validated researcher-developed questionnaire (overall  $\alpha = .933$ ) measured BAC, supervisory effectiveness, and the barriers to analytics use. Data were analyzed using frequency, percentage, weighted mean, standard deviation, independent samples t-test, one-way ANOVA with Scheffé post hoc test, and Pearson r. Results showed that BAC was present to a Very Great Extent ( $M = 3.29$ ,  $SD = 0.50$ ), with Capabilities as the weakest dimension. Respondents perceived a Very Great Effect of BAC on supervisory effectiveness ( $M = 3.41$ ,  $SD = 0.46$ ), strongest in Management and weakest in Mediation. Supervisory effectiveness differed significantly by age, sex, profession, educational attainment, and industry affiliation, with industry affiliation showing the largest effect ( $\eta^2 = .251$ ). BAC and supervisory effectiveness showed a significant but weak positive relationship ( $r = .336$ ,  $p < .001$ ), with  $r^2 = .113$ . Barriers were encountered at a Very High Level ( $M = 3.35$ ,  $SD = 0.47$ ), led by Individual Barriers and the lack of technical skills. The study concluded that analytics tools alone do not ensure effective supervision when skills and organizational support remain limited. Hence, the DATA-READY SUPERVISORS program was proposed to build supervisors' analytical skills, extend analytics to Support and Mediation, strengthen organizational and technical support, and prioritize lower-performing groups, particularly Company B and bachelor's degree holders.

**Keywords:** *business analytics capability, supervisory effectiveness, early career professionals, barriers to analytics utilization, data-driven supervision*

## Introduction

As the world becomes increasingly fast-paced and data-driven, supervision has extended far beyond traditional oversight. Early career professionals stepping into supervisory roles face the dual challenge of driving team performance and making informed, evidence-based decisions. Business analytics capability (BAC) is an organization's capacity to deploy resources, develop analytical competencies, and sustain competitive advantage through data-driven decision-making (Madhala et al., 2024). Korherr et al. (2023) similarly emphasized that such capability has become a critical enabler of managerial and supervisory decision-making. This study examined BAC across Resources, Capabilities, and Sustained Competitive Advantage and supervisory effectiveness across Management, Development, Support, and Mediation.

The study's ultimate vision was to transform supervision by moving it beyond gut-based management toward an informed, evidence-based process (Wong et al., 2022). Grassby and Gonsalvez (2022) argued that this shift toward evidence-based supervision is essential for modern organizations. Singh et al. (2023) likewise described evidence-based supervision as a process that can drive team performance and enhance decision-making. From a global perspective, a data-driven approach is not only about numbers; it also enables the next generation of leaders to lead more intelligently, drive better outcomes, and define the future of work through business analytics.

In the Philippines, the supervisory function is not only managerial but also embedded in a legal framework that balances authority with workers' rights. Under the Labor Code and the Occupational Safety and Health Standards, supervisors are expected to promote workplace safety, while data-driven approaches can help document decisions, make evaluation standards transparent, identify hazards, and support training programs (Nagashima Ohno & Tsunematsu, 2023). Business analytics must therefore remain aligned with ethical principles and data privacy requirements to prevent discrimination or misuse.

Business analytics enables supervisors to demystify complex data, recognize patterns, and make choices that support quality monitoring (Liu et al., 2023). Organizations increasingly invest in analytics because of its value in actionable decision-making (Orjatsalo et al., 2025). Young managers, however, must not only have analytical abilities but also translate analytical findings into supervisory practice. This requires a dual emphasis on technical competence and leadership development (Janiesch et al., 2022). How much early-career supervisors understand and apply analytics depends on their training and the support the organization provides (Qin et al., 2022).

Business analytics capability enables early-career professionals to shift from intuition-based to evidence-based supervisory practice. Through data, supervisors can anticipate performance challenges, optimize resource allocation, identify performance gaps, recognize high performers, and provide more precise feedback. Yet early-career professionals also face barriers to fully using analytics, including skill gaps, resistance rooted in organizational culture, data overload, inadequate infrastructure, and poor integration of analytics into routine workflows

(Korherr et al., 2023). Without organizational commitment to analytics infrastructure, training, and clear data governance policies, organizations cannot realize the full effects of BAC on supervisory effectiveness.

Although the literature acknowledges the application of business analytics to organizational performance, a knowledge gap remains regarding how early career professionals view and apply these tools to enhance supervisory effectiveness. The study therefore addressed how BAC affects the supervisory functions of Management, Development, Support, and Mediation and measured the Individual, Organizational, and Technical Barriers that may limit its use. This focus also addresses the need to understand how analytics capability translates from organizational resources into the daily supervisory practices of younger professionals.

The study was anchored on the Resource-Based View (RBV) Theory, the 4x4x4 Model of Supervision, Transformational Leadership Theory, Career Stage Theory, Human Capital Theory, and Organizational Theory. The RBV explains how Resources, Capabilities, and Sustained Competitive Advantage contribute to organizational value (Komakech et al., 2025; Madhala et al., 2024). The 4x4x4 Model of Supervision structures supervisory effectiveness around Management, Development, Support, and Mediation (Nosowska, 2022). Career Stage Theory contextualizes the learning and competency needs of early-career professionals (Savanevičienė et al., 2023), while Human Capital Theory supports investment in knowledge, skills, and competencies because they can improve productivity and performance (He & Saad, 2025). Together, these perspectives support the study's capability-centered and data-driven framework.

This study examined the effects of business analytics capability (BAC) on supervisory effectiveness among early career professionals in three selected business analytics-adopting companies in Metro Manila. Grounded in the Resource-Based View Theory (Komakech et al., 2025) and the 4x4x4 Model of Supervision (Nosowska, 2022), the study investigated how the utilization of BAC, measured across Resources, Capabilities, and Sustained Competitive Advantage, influenced supervisory effectiveness across the functions of Management, Development, Support, and Mediation. The study further aimed to design a program based on the findings to strengthen BAC-driven supervisory practice among early career professionals.

Specifically, the study sought to answer the following questions:

1. What is the profile of the early career professional-respondents as regards to;
  - 1.1 Age;
  - 1.2 Sex;
  - 1.3 Profession;
  - 1.4 Educational Attainment; and

- 1.5 Industry Affiliation?
2. What is the extent of business analytics capability among early career professionals as measured in terms of;
  - 2.1 Resources;
  - 2.2 Capabilities; and
  - 2.3 Sustained Competitive Advantage?
3. Is there a significant difference in the supervisory effectiveness of early career professionals when grouped according to their profile variables?
4. What are the effects of business analytics capability on the supervisory effectiveness of early career professionals in terms of the following functions;
  - 4.1 Management;
  - 4.2 Development;
  - 4.3 Support; and
  - 4.4 Mediation?
5. Is there a significant relationship between the utilization of business analytics capability and the supervisory effectiveness of early career professionals?
6. What is the level of barriers encountered by early career professionals in utilizing business analytics capability to enhance their supervisory effectiveness, in terms of;
  - 6.1 Individual Barriers;
  - 6.2 Organizational Barriers; and
  - 6.3 Technical Barriers?
7. Based on the results of the study, what program can be designed to strengthen the business analytics capability and supervisory effectiveness of early career professionals?

## **Methodology**

### **Research Design**

To achieve the objectives of this study, a descriptive-correlational research design under the quantitative research method was used. The design was appropriate because the study described the extent of business analytics capability, supervisory effectiveness, and barriers as they existed among the respondents and tested whether significant differences and relationships were present without manipulating the variables. The design allowed the researcher to examine

naturally occurring variations across the respondent profile and organizational settings and to determine the relationship between BAC and supervisory effectiveness.

### **Research Locale**

The study was conducted in three selected business analytics-adopting companies operating in Metro Manila. To protect organizational confidentiality, the participating organizations were coded as Company A, Company B, and Company C. Company A represented IT/Analytics Consulting, Company B represented Telecommunications, and Company C represented BPO/Customer Analytics. The three settings were selected because business analytics tools were already being used at the supervisory level and because each organization employed early career professionals aged 18 to 40 in supervisory or managerial roles.

### **Respondents and Sampling**

The population consisted of an estimated 3,300 early career professionals holding supervisory or managerial positions across the three participating companies. The Raosoft sample-size calculator was applied separately to each company's supervisory population so each stratum had a sample large enough to support reliable estimates and valid comparisons. The required sample was 278 respondents from Company A out of 1,000 supervisors, 242 from Company B out of 650 supervisors, and 312 from Company C out of 1,650 supervisors, for a total sample of 832 respondents. The study used stratified random sampling, with each company as a stratum, followed by simple random sampling within each stratum, giving every eligible supervisor an equal probability of selection (Creswell & Creswell, 2023). All 832 questionnaires were retrieved and found usable, for a retrieval rate of 100 percent.

### **Inclusion Criteria**

Eligible respondents were early career professionals aged 18 to 40 years old, employed in one of the three participating companies in Metro Manila, holding a supervisory or managerial position, and having direct exposure to or working knowledge of business analytics tools, systems, or data-driven decision-making processes. They were also willing to share insights, perceptions, and opinions relevant to the study. The Human Resources Department conducted a preliminary screening to verify that each company actively used business analytics at the supervisory level and had eligible early-career supervisors.

## Research Instrument

The primary data collection instrument was a researcher-developed survey questionnaire guided by the research title, Statement of the Problem, theoretical framework, and related literature. A screening question first verified that respondents were aged 18 to 40 and currently held a supervisory or managerial position. Part I gathered age, sex, profession, educational attainment, and industry affiliation. Part II contained 24 items measuring the extent of BAC in terms of Resources, Capabilities, and Sustained Competitive Advantage. Part III contained 32 items measuring the effects of BAC on supervisory effectiveness in terms of Management, Development, Support, and Mediation. Part IV contained 24 items measuring Individual, Organizational, and Technical Barriers. Parts II to IV used four-point Likert-type scales aligned with the verbal interpretations in the original dissertation.

The instrument underwent adviser, statistician, and expert review for content validity and relevance. A pilot test was conducted with 25 early career professionals who were not included in the actual data collection. Cronbach's alpha was computed using SPSS. Part II obtained  $\alpha = .891$  across 24 items, interpreted as Good; Part III obtained  $\alpha = .927$  across 32 items, interpreted as Excellent; Part IV obtained  $\alpha = .927$  across 24 items, interpreted as Excellent; and the entire 80-item instrument obtained  $\alpha = .933$ , indicating Excellent internal consistency based on the guide of George and Mallery (2024).

## Data Collection Procedure

After validation and pilot testing, the researcher incorporated the recommendations of the adviser, statistician, and validators and secured permission from the appropriate authorities. The researcher administered the survey face-to-face and online. The researcher informed respondents about the study, provided clear instructions, and used screening questions to verify eligibility. The researcher organized and encoded the collected data in Microsoft Excel, then analyzed them using IBM SPSS Statistics Version 27. The encoded data were screened for blank cells and entries outside the valid 1-to-4 scale before statistical analysis. The study maintained confidentiality and anonymity, and the participating companies were identified only as Company A, Company B, and Company C.

## Ethical Considerations

Participation was voluntary, and respondents were informed of the study's purpose, the nature of their participation, and their right to decline or withdraw without penalty. The questionnaire did not request names, employee numbers, or other personal identifiers. The researchers encoded responses without identifiers, stored them in password-protected files, and reported them only in aggregate form. Organizational identities were likewise protected through

coding. Data handling was aligned with Republic Act No. 10173, the Data Privacy Act of 2012, and the data were used solely for academic purposes.

### Statistical Treatment of Data

Frequency and percentage described the respondent profile. Weighted mean and standard deviation determined the extent of BAC, the effects of BAC on supervisory effectiveness, and the level of barriers. One-way ANOVA tested differences in supervisory effectiveness according to profile variables with three or more groups, while the independent samples t-test was used for sex. Levene's test was applied before the t-test, and when variances were unequal, the Welch result was reported. Significant ANOVA results were followed by Scheffé post hoc comparisons. Eta squared ( $\eta^2$ ) was used as the effect-size measure. Pearson's correlation coefficient ( $r$ ) tested the relationship between BAC and supervisory effectiveness, while  $r^2$  represented the proportion of variation associated with BAC. The significance level was set at  $p < .05$ . Cronbach's alpha assessed the instrument's internal consistency (George & Mallery, 2024).

### Results

**Table 1**  
**Profile of the Early Career Professional-Respondents**

| Profile Variable       | Largest Category                   | f (%)        | Smallest Category              | f (%)        |
|------------------------|------------------------------------|--------------|--------------------------------|--------------|
| Age                    | 31–35 years                        | 443 (53.25%) | 36–40 years                    | 37 (4.45%)   |
| Sex                    | Female                             | 562 (67.55%) | Male                           | 270 (32.45%) |
| Profession             | Operations                         | 471 (56.61%) | Administrative                 | 24 (2.88%)   |
| Educational Attainment | Bachelor's Degree                  | 700 (84.13%) | Doctoral Degree                | 27 (3.25%)   |
| Industry Affiliation   | BPO/Customer Analytics (Company C) | 312 (37.50%) | Telecommunications (Company B) | 242 (29.09%) |

Table 1 shows that the largest age group was 31–35 years old ( $n = 443$ , 53.25%), while 36–40 years old was the smallest ( $n = 37$ , 4.45%). Female respondents comprised 67.55 percent of the sample. Operations was the largest profession (56.61%), bachelor's degree holders comprised 84.13 percent, and Company C contributed the largest industry sample (37.50%). No respondent

reported Vocational/Technical educational attainment, and no respondent selected the Others profession category.

**Table 2**  
**Assessment of the Extent of Business Analytics Capability**

| BAC Dimension                   | Mean | SD   | Interpretation    | Rank |
|---------------------------------|------|------|-------------------|------|
| Resources                       | 3.30 | 0.53 | Very Great Extent | 1    |
| Capabilities                    | 3.26 | 0.53 | Very Great Extent | 3    |
| Sustained Competitive Advantage | 3.30 | 0.53 | Very Great Extent | 2    |
| Composite Mean                  | 3.29 | 0.50 | Very Great Extent |      |

Table 2 shows that BAC was present to a Very Great Extent overall ( $M = 3.29$ ,  $SD = 0.50$ ). Resources and Sustained Competitive Advantage both obtained  $M = 3.30$ , while Capabilities obtained the lowest mean ( $M = 3.26$ ). Company A obtained the highest composite mean ( $M = 3.59$ ), followed by Company C ( $M = 3.18$ ) and Company B ( $M = 3.08$ ).

**Table 3**  
**Significant Differences in Supervisory Effectiveness According to Profile**

| Profile Variable       | Test Statistic            | p-value  | $\eta^2$ | Result      |
|------------------------|---------------------------|----------|----------|-------------|
| Age                    | $F(3, 828) = 8.857$       | $< .001$ | .031     | Significant |
| Sex                    | Welch $t(641.53) = 5.893$ | $< .001$ | .035     | Significant |
| Profession             | $F(6, 825) = 2.716$       | .013     | .019     | Significant |
| Educational Attainment | $F(2, 829) = 19.283$      | $< .001$ | .044     | Significant |
| Industry Affiliation   | $F(2, 829) = 139.022$     | $< .001$ | .251     | Significant |

Table 3 shows significant differences in supervisory effectiveness according to all profile variables tested. Industry affiliation produced the largest effect ( $\eta^2 = .251$ ), while the effects of age, sex, profession, and educational attainment were small. Scheffé comparisons showed that respondents aged 26–30 rated supervisory effectiveness higher than those aged 31–35 (mean difference = .177,  $p < .001$ ); bachelor's degree holders rated it lower than master's degree holders (mean difference =  $-.273$ ,  $p < .001$ ) and doctoral degree holders (mean difference =  $-.242$ ,  $p = .025$ ); and Company B was significantly lower than Company A and Company C. For profession, only Human Resource and Operations differed significantly (mean difference =  $-.187$ ,  $p = .024$ ).

Table 4 shows a Very Great Effect of BAC on supervisory effectiveness ( $M = 3.41$ ,  $SD = 0.46$ ). Management ranked first ( $M = 3.44$ ), followed by Development ( $M = 3.41$ ), Support ( $M = 3.40$ ), and Mediation ( $M = 3.39$ ). Company A obtained  $M = 3.58$ , Company C obtained  $M = 3.53$ , and Company B obtained  $M = 3.05$ .

**Table 4**  
**Effects of Business Analytics Capability on Supervisory Effectiveness**

| Supervisory Function | Mean | SD   | Interpretation    | Rank |
|----------------------|------|------|-------------------|------|
| Management           | 3.44 | 0.46 | Very Great Effect | 1    |
| Development          | 3.41 | 0.50 | Very Great Effect | 2    |
| Support              | 3.40 | 0.54 | Very Great Effect | 3    |
| Mediation            | 3.39 | 0.53 | Very Great Effect | 4    |
| Composite Mean       | 3.41 | 0.46 | Very Great Effect |      |

**Table 5**  
**Relationship Between Business Analytics Capability and Supervisory Effectiveness**

| Variables                           | r    | r <sup>2</sup> | t      | p-value  | Degree        | Result      |
|-------------------------------------|------|----------------|--------|----------|---------------|-------------|
| Overall BAC and Overall Supervisory | .336 | .113           | 10.268 | $< .001$ | Weak Positive | Significant |

|               |  |  |  |  |  |  |
|---------------|--|--|--|--|--|--|
| Effectiveness |  |  |  |  |  |  |
|---------------|--|--|--|--|--|--|

Table 5 shows a significant but weak positive relationship between BAC and supervisory effectiveness,  $r = .336$ ,  $t(830) = 10.268$ ,  $p < .001$ . The coefficient of determination ( $r^2 = .113$ ) indicates that approximately 11.3 percent of the variation in supervisory effectiveness was associated with BAC.

**Table 6**  
**Correlation Matrix Between BAC Dimensions and Supervisory Effectiveness**

| BAC Dimension                   | Management | Development | Support | Mediation | Overall SE |
|---------------------------------|------------|-------------|---------|-----------|------------|
| Resources                       | .321       | .271        | .324    | .320      | .339       |
| Capabilities                    | .300       | .247        | .281    | .263      | .299       |
| Sustained Competitive Advantage | .290       | .271        | .280    | .275      | .306       |
| Overall BAC                     | .324       | .280        | .315    | .305      | .336       |

All correlations in Table 6 were positive and significant at  $p < .001$ . Resources had the strongest relationship with overall supervisory effectiveness ( $r = .339$ ), while Capabilities had the weakest overall relationship ( $r = .299$ ). The smallest dimension-function coefficient was between Capabilities and Development ( $r = .247$ ).

**Table 7**  
**The Level of Barriers Encountered**

| Barrier Dimension   | Mean | SD   | Interpretation  | Rank |
|---------------------|------|------|-----------------|------|
| Individual Barriers | 3.37 | 0.49 | Very High Level | 1    |
| Technical Barriers  | 3.36 | 0.51 | Very High Level | 2    |
| Organizational      | 3.32 | 0.51 | Very High Level | 3    |

|                |      |      |                 |  |
|----------------|------|------|-----------------|--|
| Barriers       |      |      |                 |  |
| Composite Mean | 3.35 | 0.47 | Very High Level |  |

Table 7 shows that barriers were encountered at a Very High Level overall ( $M = 3.35$ ,  $SD = 0.47$ ). Individual Barriers ranked first ( $M = 3.37$ ), followed by Technical Barriers ( $M = 3.36$ ) and Organizational Barriers ( $M = 3.32$ ). Company B reported the highest composite barrier mean ( $M = 3.51$ ). The highest individual-barrier item was lack of technical skills ( $M = 3.42$ ), while technical issues in accessing analytics tools were the highest technical barrier ( $M = 3.40$ ).

## Discussions

**Profile of the Respondents.** The profile indicates that early career supervision in the three participating companies was concentrated among respondents aged 31–35, women, Operations personnel, bachelor's degree holders, and employees from Company C. The large Operations group means that much of the evidence reflects supervisors who manage daily operational performance, where analytics can be used directly to identify problems and monitor results. Ouanhlee (2023) similarly described business analysis as a way to identify business needs and solve daily work problems. The dominance of bachelor's degree holders also suggests that much of supervisors' analytics competence may have developed through workplace exposure rather than graduate education, consistent with Qin et al. (2022), who mapped the analytics skillsets industries seek.

**Extent of Business Analytics Capability.** BAC was present to a Very Great Extent, with Resources and Sustained Competitive Advantage obtaining the highest combined means and Capabilities ranking last. In Resources, automated reporting that reduces manual errors was the highest-rated indicator, while data visualization for monitoring team performance was lowest. Komakech et al. (2025) emphasized that strategically valuable resources form the basis of competitive advantage, supporting the result that the companies had already invested in data systems and reporting resources. The comparatively lower result for data visualization, however, shows that having tools does not automatically mean all information is equally easy to interpret.

Capabilities, although still rated at a Very Great Extent, were the weakest BAC dimension. Confidence in supervisory tasks and the use of predictive analytics to anticipate problems were the strongest capability indicators, while problem-solving skills obtained the lowest rating. Schmitt (2023) explained that business analytics progresses from describing past data toward predicting what may happen next, which supports the high rating for predictive use. At the same time, Hussinki et al. (2022) stressed that a functioning analytics capability depends on the human skills of the people who use it. Thus, analytics tools alone do not strengthen supervisory problem solving unless supervisors also develop the competence to interpret and apply the outputs.

Sustained Competitive Advantage was also rated to a Very Great Extent. Reducing costs associated with errors received the highest mean, while sustaining high performance standards received the lowest. Oesterreich et al. (2022) found that business analytics investments generate measurable business value, and Sakib (2022) described big data as a source of competitive advantage. These findings support the respondents' view that analytics contributes to efficiency and competitive position. However, the lower rating for sustaining high performance indicates that durable advantage requires more than analytics' immediate operational benefits.

The company results reinforce this interpretation. Company A showed the highest BAC composite mean, while Company B showed the lowest. Capabilities ranked last in all three companies. Madhala et al. (2024) explained that organizations must develop data analytics capabilities over time, while Arora and Mittal (2024) found that analytics capabilities improve organizational performance through innovative capability. Therefore, the main development need is not simply acquiring more tools but strengthening supervisors' ability to interpret, solve problems, and apply data in their work.

Differences in Supervisory Effectiveness According to Profile. Supervisory effectiveness differed significantly by age, sex, profession, educational attainment, and industry affiliation. Industry affiliation had the largest effect, indicating that organizational context was more strongly associated with supervisory effectiveness than the other profile variables. Career Stage Theory explains why supervisory needs and behaviors may vary at different stages of working life (Savanevičienė et al., 2023). The significant difference by education is likewise consistent with Human Capital Theory and He and Saad's (2025) observation that investments in education and skills influence productivity and employment outcomes.

The Scheffé comparisons further showed that respondents aged 26–30 rated their supervisory effectiveness higher than those aged 31–35, bachelor's degree holders rated it lower than respondents with master's and doctoral degrees, and Company B was significantly lower than both Company A and Company C. Fazi et al. (2025) noted that attitudes and expectations shaping technology adoption at work differ by age. The lack of a significant difference between Company A and Company C, despite their different industries, suggests that organizational practices around analytics may matter more than industry label alone. Company B therefore becomes a priority for developmental intervention.

Effects of BAC on Supervisory Effectiveness. BAC had a Very Great Effect across all four supervisory functions, with Management ranking first. The highest Management indicator was identifying underperforming areas faster, while data-driven goal setting was lowest. Korherr et al. (2023) found that managers move from intuition-based decisions toward analytics-based decisions. This supports the finding that analytics helps supervisors quickly identify weak areas. Orjatsalo et al. (2025) also found that top managers use analytics in decisions about resources and organizational direction, suggesting an opportunity for early-career supervisors to extend analytics beyond monitoring into goal setting.

Development ranked second. Using data metrics to track team development progress was the strongest indicator, while interpreting analytics reports to guide training was weakest. Grassby and Gonsalvez (2022) showed that supervision competencies can be measured and developed, supporting the use of metrics to track employee growth. The lower score for interpreting analytics reports, however, is consistent with the weaker Capabilities dimension and shows a need to strengthen supervisors' ability to translate reports into training and future skill-development decisions.

Support ranked third. Analytics was most helpful in understanding the root causes of employee challenges, while its effect on the approach to conflict resolution was lowest. Sewell et al. (2024) described support as part of regular supervisory practice, and Muhammad and Naz (2022) found that HR analytics strengthens links among employee engagement, retention, and organizational performance. These results indicate that analytics can support people-centered supervisory work, but its application to interpersonal support and conflict situations remains less developed than its use for management.

Mediation ranked fourth, although it still received a Very Great Effect rating. Reliance on data rather than personal judgment alone was the strongest indicator, while identifying patterns that lead to recurring conflicts was the weakest. Akel et al. (2023) described business analytics as a process of making actionable decisions from historical information and ongoing performance monitoring. This supports the use of recorded evidence in fair mediation. Mazher and Tramankuti (2024), however, noted challenges in applying business analytics to decision-making, which may help explain why recurring conflict patterns are harder for supervisors to interpret.

**Relationship Between BAC and Supervisory Effectiveness.** The study found a significant but weak positive relationship between BAC and supervisory effectiveness ( $r = .336, p < .001$ ). The relationship was therefore statistically real but modest. The coefficient of determination indicates that about 11.3 percent of the variation in supervisory effectiveness was associated with BAC, meaning most variation was due to other factors. Chatterjee et al. (2024) found that business analytics contributes to organizational performance and business value, supporting a positive relationship. Mamakou and Manaras (2024) also showed that business analytics can generate individual and firm benefits, but the weak correlation here suggests analytics is only one part of effective supervision.

The correlation matrix showed that Resources had the strongest relationship with overall supervisory effectiveness, while Capabilities had the weakest. Development consistently showed the smallest correlations with the BAC dimensions. Khan and Tao (2022) found that big data analytics and digital platform capability can improve innovation performance through knowledge absorption. In the present study, the weak coefficients indicate that resources become useful only when supervisors can absorb, interpret, and apply the data. This again points to capability development as the bridge between access to analytics and supervisory outcomes.

**Barriers to Business Analytics Utilization.** Individual Barriers ranked first, and the lack of technical skills was the highest individual barrier. Lutfi et al. (2023) reported that organizations

often fail to prepare employees with the skills needed for analytics adoption, while Siddiqua et al. (2023) showed that skills and infrastructure can limit analytics benefits. The very high individual-barrier rating, particularly in Company B, therefore confirms that supervisors require systematic training and hands-on practice rather than access to analytics tools alone.

Organizational Barriers were also encountered at a Very High Level. The greatest organizational concerns were a lack of leadership encouragement and recognition for using analytics in supervision. Shi et al. (2022) reported that analytics-driven innovation can fail because of technical and cultural issues, while Coolen et al. (2023) emphasized the importance of institutionalizing workforce analytics into regular organizational practice. The findings indicate that organizations need explicit leadership support, recognition systems, and clear governance arrangements so that analytics becomes a normal part of supervision rather than an optional individual practice.

Technical Barriers likewise remained very high. Technical issues in accessing analytics tools and delays in data access were among the greatest concerns. Muchenje et al. (2024) explained that the benefits of business analytics depend on the fit between the technology and the task, while Vadithe and Kesari (2025) found that technology enablers support the successful implementation of HR analytics. These findings indicate that even supervisors who value analytics may be prevented from using it effectively when systems are difficult to access, or support is insufficient.

Taken together, the results show a dual condition: respondents reported a Very Great Extent of BAC while also reporting Very High Barriers. This means analytics resources do not eliminate the difficulties of using them. Company B shows this pattern most strongly because it reported the lowest BAC and supervisory-effectiveness means and the highest barrier mean. Farida and Setiawan (2022) identified technology mastery and quality human resources as foundations of competitive advantage, while Opatha et al. (2025) emphasized the influence of analytics competency on business performance. The findings therefore support a program that combines skill development, organizational support, technical access, and company-specific intervention.

### **DATA-READY SUPERVISORS Program**

Based on the findings, the study proposes DATA-READY SUPERVISORS: A Data-Driven Supervisory Effectiveness Program for Early Career Professionals. The one-year, company-based program directly addresses the weakest BAC dimension, the lower-rated supervisory functions, the significant profile differences, and the Very High barriers identified in the study. Particular attention is given to Company B, bachelor's degree holders, supervisors aged 31–35, and Human Resource personnel because these groups showed comparatively lower supervisory-effectiveness results.

The program uses a one-year implementation cycle and a four-level monitoring and evaluation plan covering Reaction, Learning, Application, and Results. Reaction is assessed after each activity; Learning is measured through pre-test, post-test, and practical exercises; Application is monitored through documented cases, supervisor reports, and coaching notes; and Results are assessed at the end of Quarter 4 by repeating Parts II to IV of the study questionnaire. This structure allows the participating companies to determine whether BAC, supervisory effectiveness, and barriers change after implementation.

**Table 8**  
**Program Matrix of the DATA-READY SUPERVISORS Program**

| Program Area                                           | Objectives                                                                                           | Strategies and Activities                                                                                                                       | Persons Involved                                                        | Time Frame                         | Success Indicators                                                                                         |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1. Analytics Interpretation and Problem-Solving Skills | To improve the ability of supervisors to interpret analytics outputs and use them in problem solving | Hands-on workshops on reading dashboards and reports; root cause analysis sessions using data; short modules on filtering and prioritizing data | Early career supervisors, training and development unit, analytics team | Quarter 1, with monthly refreshers | At least 80 percent of participants complete the modules; problem-solving item reaches a very great extent |
| 2. Data-Informed Team Development                      | To help supervisors use analytics in planning team training and future skill needs                   | Training on skills gap analysis; competency dashboards in individual development plans; coaching with senior analysts                           | Supervisors, learning and development unit, department heads            | Quarters 1 to 2                    | Data-based development plans for all team members; higher and more consistent Development ratings          |
| 3. Analytics-Supported Support and Mediation           | To strengthen the use of analytics in timely support and in identifying recurring conflicts          | Workshops on engagement and wellbeing indicators; conflict pattern analysis using team data; role-play on                                       | Supervisors, employee relations unit, team members                      | Quarter 2                          | Documented use of data in support and mediation cases; higher Support and                                  |

|                                                     |                                                                                                    | presenting data<br>results during<br>mediation                                                                                              |                                                                     |                 | Mediation<br>ratings                                                                        |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|
| 4.<br>Organizational Support<br>and Data Governance | To reduce organizational barriers through leadership support, recognition, and clear data policies | Leadership orientation on analytics-based supervision; recognition scheme for data-driven supervision; data use and governance policy       | Top management, human resource office, data governance or IT office | Quarters 1 to 3 | Approved data use policy; recognition scheme in place; lower Organizational Barriers rating |
| 5.<br>Technical Access and Support                  | To reduce technical issues and delays in data access                                               | Help desk for supervisor analytics concerns; review of system access and data delivery; supervisor dashboard templates                      | IT department, analytics team, supervisors                          | Quarters 2 to 3 | Faster resolution of access issues; lower Technical Barriers rating                         |
| 6.<br>Company-Specific Case Study Learning          | To share practical lessons across companies and close the gap observed in Company B                | Anonymized case study sessions from Company A, B, and C; peer learning circles; mentoring for bachelor's degree holders and new supervisors | Supervisors from the three companies, facilitators, mentors         | Quarters 3 to 4 | Completed case analyses; higher Company B ratings in the follow-up assessment               |

## Conclusion

1. The typical early career supervisor in the three companies is a female bachelor's degree holder aged 31 to 35 who works in Operations, and the largest group of respondents comes from the BPO company.
2. Business analytics capability among early career professionals is at a very high extent in terms of resources, capabilities, and sustained competitive advantage, with capabilities as the weakest dimension and Company A as the most capable company.

3. There is a significant difference in the supervisory effectiveness of early career professionals when grouped according to age, sex, profession, educational attainment, and industry affiliation, and the null hypothesis is rejected, with the company where the supervisor works having the strongest influence.
4. Business analytics capability has a very great effect on the supervisory effectiveness of early career professionals in terms of management, development, support, and mediation, with the effect being strongest in management and weakest in mediation.
5. There is a significant but weak positive relationship between the utilization of business analytics capability and the supervisory effectiveness of early career professionals; hence, the null hypothesis is rejected.
6. Early career professionals encounter individual, organizational, and technical barriers at a very high level in utilizing business analytics capability, with individual barriers, especially the lack of technical skills, being the most serious and Company B facing the highest barriers.
7. The DATA-READY SUPERVISORS program is an appropriate response to the findings, since it targets the weakest capabilities, the lowest supervisory functions, the highest barriers, and the groups with lower supervisory effectiveness.

## **Recommendation**

1. Organizations may use the profile of their supervisors in planning development programs by designing analytics training for supervisors who are experienced workers but new to leading teams, while young professionals may take part in these programs early in their supervisory careers.
2. Organizations, especially Company B and Company C, may strengthen the capabilities dimension by training supervisors in problem-solving and in reading dashboards and reports, while young professionals may practice using analytics to solve problems and not only to monitor results.
3. Managers and supervisors may give closer guidance to the groups with lower supervisory effectiveness, namely supervisors of Company B, bachelor's degree holders, supervisors aged 31 to 35, and Human Resource personnel, and may make sure that female supervisors, whose ratings were slightly lower, receive equal access to analytics training and coaching, while organizations may support the graduate studies of supervisors who wish to pursue them, and Company B may learn from the analytics practices of Company A and Company C.

4. Managers and supervisors may extend the use of analytics from management tasks to the support and mediation functions by using team data to provide timely support and to find the causes of recurring conflicts, while young professionals may apply data more often when setting team goals and planning team training.
5. Organizations may support analytics capability with a culture that recognizes its use, clear policies, and regular practice, since capability alone explains only a small part of supervisory effectiveness, and may give priority to improving the resources that supervisors use daily, which showed the strongest link to supervisory effectiveness, while managers and supervisors may set an example by using data in their own decisions.
6. Organizations may reduce barriers by providing hands-on technical skills training, recognizing supervisors who use analytics well, issuing clear policies on data use, and improving access to analytics tools and data, while young professionals may seek help early when they meet problems in using analytics.
7. Organizations, through their human resource and training units, may adopt and carry out the DATA-READY SUPERVISORS program, monitor its results using the four-level evaluation plan, and repeat the study questionnaire after one year to measure progress, while the proponent of the study may assist the companies in its implementation.
8. Future researchers may conduct similar studies in other industries and regions, include supervisors beyond the early career stage, use longitudinal or mixed-method designs to test whether business analytics capability causes changes in supervisory effectiveness, examine the reasons behind the differences by sex and profession found in this study, and test barriers as a moderating variable in the relationship between business analytics capability and supervisory effectiveness.

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