

Addressing the growing complexity of global work through human resources analytics: hidden patterns in turnover

Hila Chalutz Ben-Gal  
(Corresponding Author)

Afeka Tel Aviv Academic  
College of Engineering

[hilab@afeka.ac.il](mailto:hilab@afeka.ac.il)

Dan Avrahami  
Tel Aviv University

[dan.avrahami@gmail.com](mailto:dan.avrahami@gmail.com)

Dana Pessach  
Tel Aviv University  
[danapessach@gmail.com](mailto:danapessach@gmail.com)

Gonen Singer  
Afeka Tel Aviv Academic  
College of Engineering

[SingerG@afeka.ac.il](mailto:SingerG@afeka.ac.il)

**Abstract**

The growing complexity of global work poses key challenges on the human resources function (Rosenzweig & Nohria, 1994; Tzafrir et al., 2004). Imagine a utopian world in which organizations could recruit and retain employees resulting in ideal jobs and perfect organizational fit. Can one define and measure, based on newly available organizational data, the perfect match between global employees and their jobs? Similarly, between employees and their global organization? In this ideal world, some of the expected organizational benefits from systematically analyzing organizational data might be higher employee performance (Crook et. al., 2011; Kacmar et. al., 2006; Ton and Huckman, 2008), higher employee satisfaction (Brown and Lam, 2008; Clugston, 2000; de Olivera et. al., 2017), improved employee motivation and commitment (Ertas, 2015; Jin et. al., 2016; Kim, 2012), and lower employee turnover (Griffeth et. al., 2000; Koys, 2001; Parker and Gerbasi, 2017). Literature examined some of these phenomena with regards to various antecedents (Cable & Judge, 1996; Keidai Ronshu, 2004; Kristof-Brown et. al, 2005) resulting in a variety of conclusions. This study examines some of the known conventions regarding turnover within the context of the growing complexity of global form of work. More specifically, this study proposes a new framework for improving the recruitment process of global employees. By examining turnover rates, we attempt to predict and highlight the fit between global employees and global jobs, in order to

maximize workforce potential. This study utilizes advanced data analytics methods over a very large dataset in order to systematically explore hidden patterns in global employee turnover. The robust HR analytics methodology utilized enabled us to draw insightful conclusions compared to traditional hypothesis driven methodology. This methodology is particularly insightful when utilizing large global data sets. We found varying turnover indications with regards to specific jobs which are global in nature. Additionally, study results indicate that the turnover may vary between roles, gender, religion and cultural background of job holders, thus contributing to the counter-intuitive nature of turnover when examining a global workforce. This study proposed two main contributions. First, from a practical perspective, we propose a new approach to measure and analyze turnover in the global workforce context, based on HR analytics and pattern recognition methodology, while providing actionable recommendations. Second, from a theoretical perspective, we lay some groundwork for new theory development when using data-driven methods which became popular and effective in the past decade and are now steadily entering the HR domain.

### **Theoretical framework: turnover**

In recent years, turnover has become a major concern in global settings because organizations make enormous investments in their global employees in terms of recruiting, training, developing and retaining them. Turnover is usually associated with potential risk to the organization because it can significantly impact costs. Such costs stem from recruitment and selection expenses, training costs, and loss of human capital, which are typically difficult to measure but can be quite substantial (de Oliveira et al., 2017). The subject has attracted increased attention from both scholars and human resource professionals due to the growing difficulty in retaining skilled global employees (Cappelli, 2008; Towers Watson, 2012). Job satisfaction has been consistently found to be a strong predictor of turnover intention and actual voluntary turnover (Clugston, 2000; Griffeth et al., 2000; Tett & Meyer, 1993).

Some researchers have distinguished between global employees who leave organizations voluntarily and those who are dismissed or who leave as part of a reduction-in-force. Voluntary turnover captures the departure of employees from organizations of their own free will. Because people who are more skilled or who perform better in their jobs are believed to have more external employment opportunities available to them than average or poor employees, they are more likely to leave (Holtom & Burch, 2016; Holtom et al., 2017). This distinction broadens our understanding of how different types of turnover impact global organizations. However, since many organizations fail to differentiate between voluntary and involuntary turnover, some studies have examined total turnover (Holtom & Burch, 2016), as we do in this study.

Global downsizing is another type of turnover to address. Although downsizing is typically enacted by organizational leaders to reduce labor costs and increase efficiency levels, some recent studies have suggested that the anticipated benefits are overshadowed by decreases in business outcomes, e.g., customer service, productivity and profitability (Tzafir, Chalutz Ben-Gal, and Dolan, 2012; Holtom & Burch, 2016; Subramony & Holtom, 2012).

The literature has discussed various turnover types (e.g., Kacmar et al., 2006, Koys, 2001, Plomondon et al., 2007, Ton & Huckman, 2008, Holtom & Burch, 2016), which are beyond the scope of this study. Our focus is to discover how turnover is interpreted in global work settings using HR analytics tools.

### **Methodology**

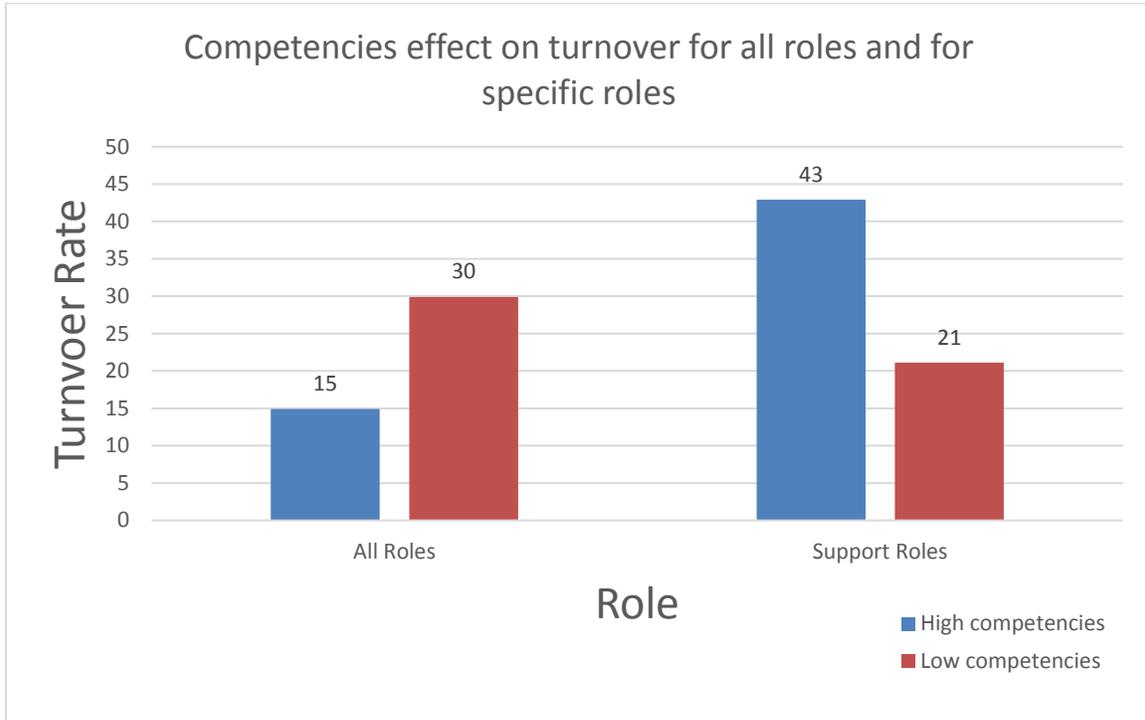
In this study we aim to discover hidden patterns in global employee turnover by utilizing new tools. The study was executed using the HR analytics methodology (Chalutz Ben-Gal, 2017; Pessach et al., 2017). More specifically, big data and machine learning prediction algorithms were applied on the large dataset to discover hidden patterns associated with employee turnover.

The purpose of integrating this methodology had several origins. First, utilizing a data-rich algorithm-based prediction methodology enabled us to more deeply discover the nature of the target variables from a new and fresh perspective. Second, the traditional hypotheses-testing methodology, poses various limitations and narrows the opportunity for quantitative discoveries (Bamberger and Ang, 2016). Third, using a pattern detection algorithm for HR analytics enabled us to extract new insights on the subject. Thus, we propose an optimization method to maximize the probability for successful global job assignment. Fourth, the pattern detection methodology applied aimed at discovering insights from available data using no preliminary hypotheses, assumptions or other potential biases. As a result, this approach generated granular models that addressed sub-populations that are sufficiently large to be considered interesting from an HR perspective. Furthermore, it enabled the calculation of the probability per employee of succeeding in a specific intended role, based on personalized characteristics. As a result, insightful and actionable recommendations could be formulated, utilizing non-intuitive phenomena, which are difficult to detect by a conventional hypothesis-driven research (for example, unique patterns in employee recruitment, development, retention, etc.).

## Results

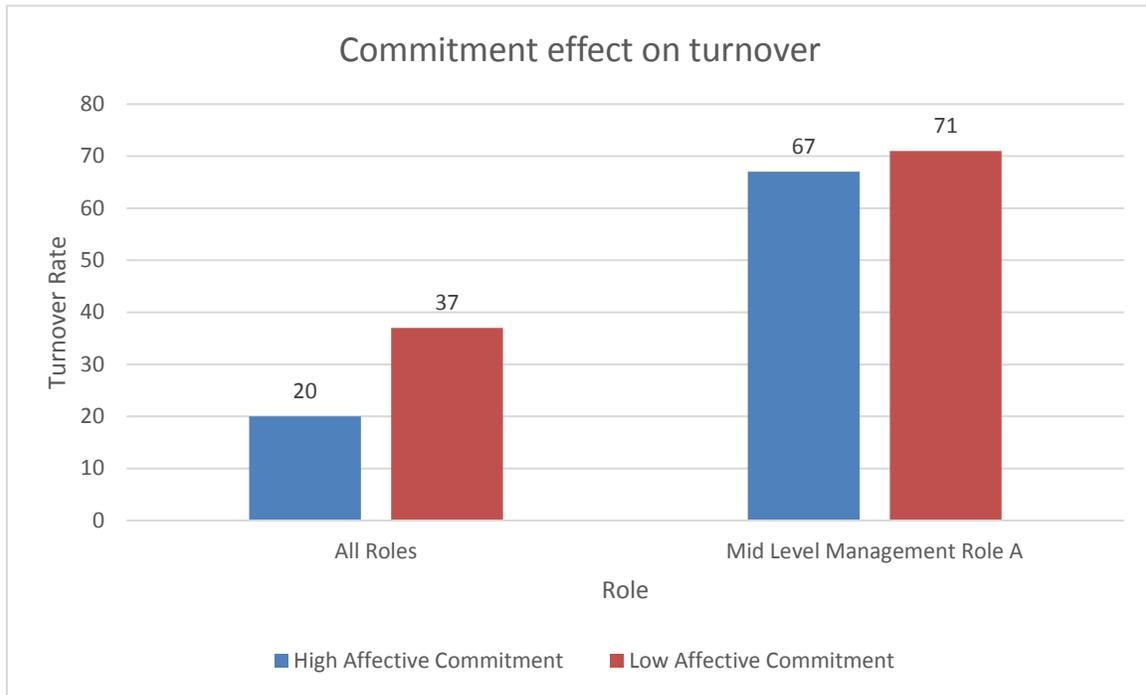
The HR analytics approach undertaken in this study revealed some surprising and somewhat unintuitive findings regarding the nature of global turnover. The global employee's competencies play important roles in turnover in general and in person-job fit more specifically (Elfenbein and O'Reilly, 2007).

**Figure 1**



The results presented in Figure 1 indicate that competencies' effects on turnover are role associated. Figure 1 indicates that in certain global settings candidates with high competencies demonstrate significantly higher turnover rates (43%), compared to roles associated with low competencies (21%).

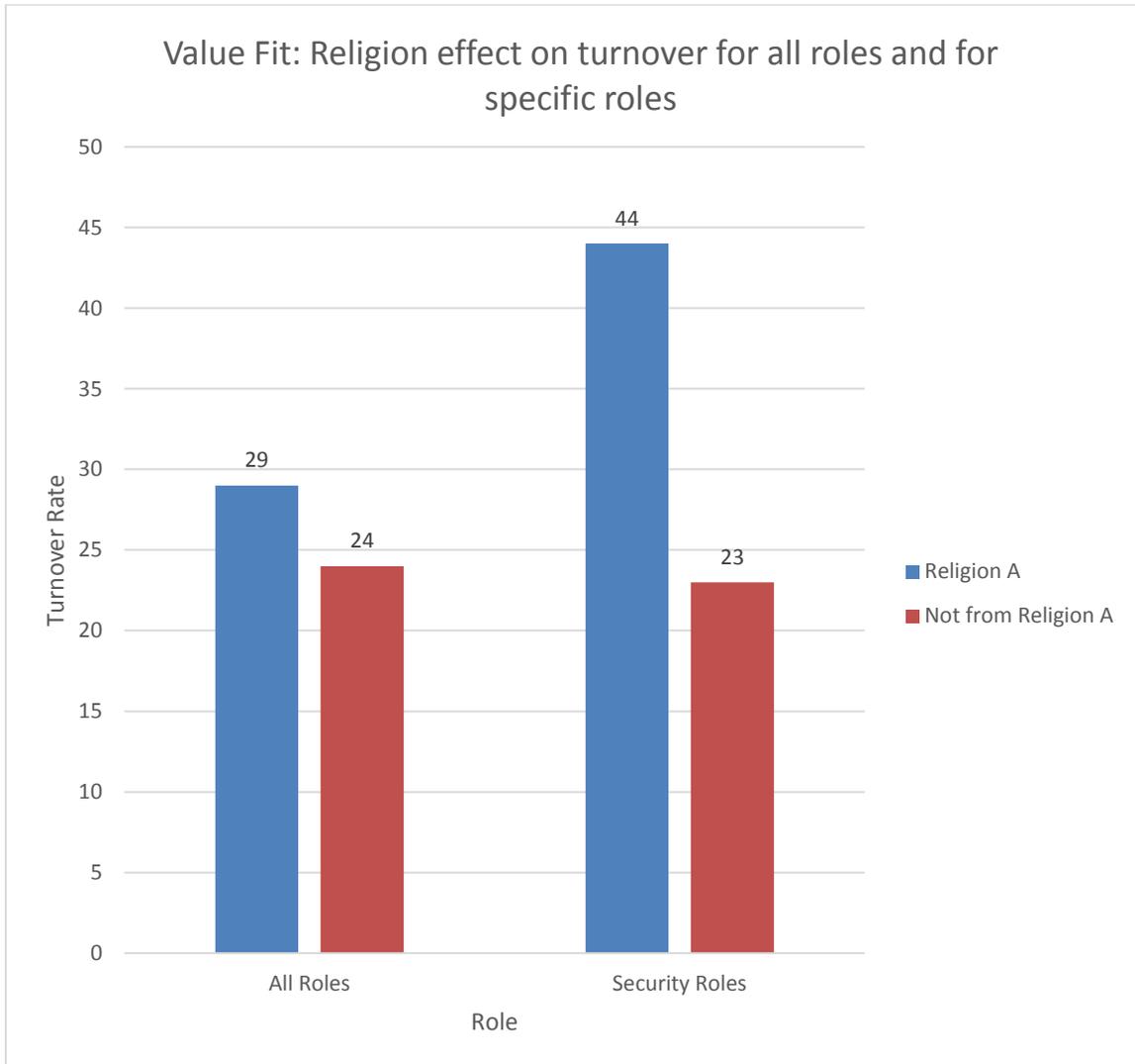
**Figure 2**



It is known that employees who experience OC tend to extend and prolong exchange processes with peers and stakeholders and with the organization as a whole (also supported by earlier studies, such as Chalutz Ben-Gal & Tzafrir, 2011; Meyer & Parfyonova, 2010). However, despite this evidence, Figure 2 indicates a different association between commitment and turnover, suggesting that Person-Organization fit is a non-linear phenomenon that is disruptive and counter-intuitive at times.

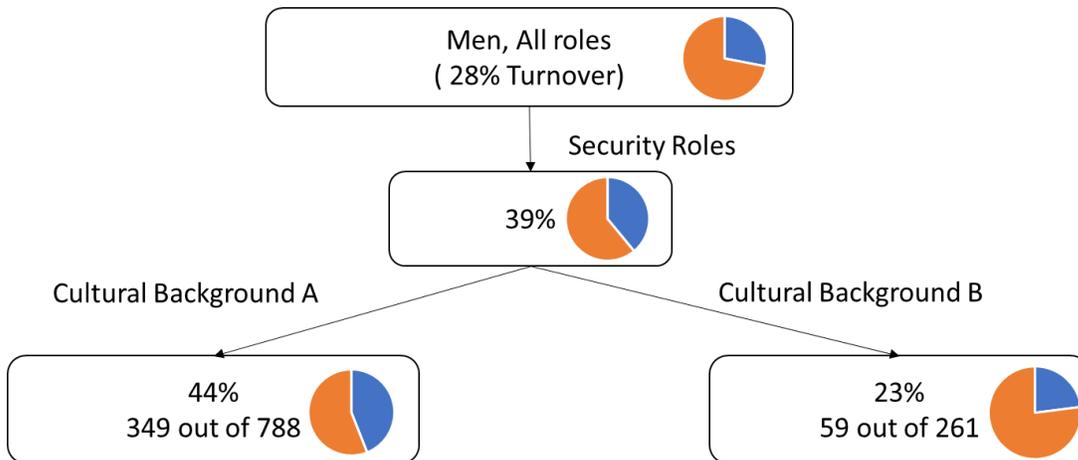
As shown in Figure 2, the relationship between OC and turnover is role dependent, more specifically so in the global context. Thus, the association between OC and turnover can flip, resulting in a poorer fit between the employee and the organization. Figure 2 indicates that when examining all roles, commitment generates a 17% difference (20% vs. 37%) between candidates with high commitment and candidates with low commitment levels. This trend changes when examining specific management roles, and as a result, the difference dramatically decreases to 4% (67% vs. 71%). In light of these findings, it seems that commitment affects turnover changes when examining various roles and within the varying global context.

**Figure 3**



**Figure 4**

**Value Fit: Religion effect on turnover for specific roles**



It was found that individual and organizational values have important effects on turnover. Moreover, there is scientific evidence that the tighter that the fit is, the more that turnover levels decrease (also supported in the literature, e.g., see Elfenbein and O'Reilly, 2007). Figures 3 and 4 present a different relationship between value fit and turnover, suggesting that the theory of P-O fit is a flexible phenomenon. Study results point in the direction of a negative association between value fit and turnover under specific circumstances.

Figure 3 illustrates that when examining all roles, a minor 5% effect of the cultural background of the candidate was identified. Surprisingly, when examining a specific security role, we identified a substantially larger effect (21%) of cultural background on turnover rates. Figure 4 illustrates how, for candidates of a specific religion, turnover rates are significantly higher (23% and 44%, respectively). Similarly, Figure 4 indicates that when examining this specific security role, a substantially different effect for male and female candidates is identified (44% compared to 23%, respectively). This finding allows us to analyze two sub-population, which differ significantly in their effects, thus resulting in different turnover rates.

**Discussion**

The main goal of this study was to undertake a “big data” or data-driven HR analytics-based approach to reveal hidden patterns in employee turnover within the context of the growing complexity of the global form of work (Bamberger and Ang, 2016; Chalutz Ben-Gal, 2017; Marler and Boudreau, 2016).

This study revealed that specific roles yield high turnover for employees whose competencies are high, which are crucial in the global context. This finding is somewhat counterintuitive because one would expect that employees experiencing low fit would tend to leave the organization more often (Elfenbein and O'Reilly, 2007; Jin et. al., 2016). On the other hand, given the global context, it makes sense that employees with specific high competencies, such as leadership skills and quality indicators, tend to be looking for their next professional challenge. We provide several explanations.

First, this outcome might be explained from a macro-organizational perspective. Human Capital Theory (hereafter, HCT) sheds some light on our findings. According to HCT (Schultz, 1961), competencies are imbedded in people's traits, on the one hand, as well as in their behaviors, on the other hand. Although we also found evidence that employee behavior is meaningful, our study indicates that in line with

HCT, in some cases, unexpected behavior is the norm (e.g., unexpected turnover).

Second, this outcome might be explained from a micro-organizational perspective. The Theory of Reasoned Action (hereafter, TRA) sheds some light on our findings. According to the TRA (Ajzen & Fishbein, 1973), human beings are basically rational and make systematic use of information available to them when making decisions. Additionally, the TRA assumes that human behaviors are under the total control of the performer, and the TRA has been found to be useful in predicting a wide range of behaviors. Since we demonstrated that P-J fit is disruptive at times, employee competencies might reflect the final output of a reasoned action (e.g., turnover), explaining the missing link between competencies and, at times, unpredicted employee behaviors.

Third, from the P-J fit theoretical perspective (Kristof-Brown et. al., 2005), the relationship between employee characteristics and job characteristics, as well as demand and supply perspectives (Edwards, 1991), might not be sufficient to explain fit or the lack thereof. Our analysis provides some insights into the multi-faceted nature of the P-J fit theory by capturing when employees demonstrate non-fit behaviors (i.e., turnover) despite that fit existing.

Surprisingly, the second hidden pattern example that we illustrated was that specific roles yield high turnover for employees whose commitment is high. Assuming that high levels of turnover indicate low fit, one of the more interesting observations is that the P-O fit theory is an unexpected phenomenon. Since these findings are somewhat unforeseen, we believe that part of the explanation might be found in a generational explanation. Millennials were the majority of this study's employees, showing that the era in which a person was born and the significant events that take place as they come of age affect their worldviews, as well as their values and attitudes toward work (Ertas, 2015). As a result, millennials pose challenging commitment implications for organizations. More specifically, by examining the hidden patterns of commitment, we were able to analyze an emergent definition of P-O fit. These identified hidden patterns of the relations between commitment and turnover could lay the groundwork for new theory development.

With regards to the cultural perspective depicted in Figures 3 and 4, specific global roles

yielded high turnover rates for employees who demonstrated high levels of value fit. More specifically, by examining the hidden patterns of value fit, we were able to shed light on an emergent definition of turnover. These identified hidden patterns of relations between value fit and turnover, from a P-O fit perspective, could lay the groundwork for new theory development in two distinct manner. First, from a Stakeholder Theory perspective (Freeman, 1999), similar to an organizational downsizing scenario (Tzafirir, Chalutz Ben-Gal and Dolan, 2012), our study's complex service delivery setting highlights the central role of values. In a service setting, employees enter the service delivery process with stable individual values and grounded notions of what "ought" and what "ought not" be (Ibid, p. 401). Thus, the interactions between actors in this process 'lay the foundation' for an understanding of other actors' behavior and attitudes, as well as influencing them. Therefore, these values help us to predict, interpret, and act accordingly to achieve better performance' (Ibid, p. 402). A fit, or lack thereof, is influenced by this relationship. Second, from a management by values (hereafter, MBV) perspective (Dolan and Garcia, 2002), a cultural redesign assists organizations in achieving effectiveness. Therefore, we adopt this framework and expand it to a "Management by Fit" approach. In a service organization, in which multiple stakeholders exist, the challenge of aligning values is even more complex. Key stakeholders -- clients, service providers, employees, and others -- must attain a clear understanding of which values and beliefs are to be aligned, as well as how to undertake the process of adaptation in a successful manner. The 'strategic leadership tool' suggested by Dolan and Garcia (2002, p. 102), is of value to contribute to successful adaptation amongst stakeholders.

In light of all of the above illustrated findings, we suggest that a better fit (Nadler & Tushman, 1980) between employee and organizational values is managed by our proposed "Management by Fit" approach. The basic assumption (O'Reilly et. al., 1991) is that the closer that the fit is, the lower that the conflict is inherent in the particular situation (high-quality service delivery, for example). Our study results emphasize the importance of fit. Organizational working processes are founded on a set of both individual and organizational work values that derive from the beliefs and perceptions inherent in culture and that guide interactions between actors. The better that the fit is between the levels,

the higher that the probability is of positive organizational outcomes and organizational success. We therefore propose that value fit, or a lack thereof, contributes to the disruptive nature of the P-O fit theory as a whole, thus laying the groundwork for new theory development (Kristof, 1996; O'Reilly et al., 1991).

### Contribution

The findings presented above offer three significant contributions. First, from a practical perspective, the HR analytics approach, using an algorithm-based tool, was implemented in this study and offers a unique and practical tool to fine tune and improve organizational recruitment tools. Moreover, it enables the overcoming of challenges associated with the recruitment process, e.g., subjectivity and intuition, by identifying unique patterns of turnover within a global context. The HR analytics approach offered in this study supports employee placement process by highlighting hidden patterns and behaviors, thus enabling higher probability of P-J fit and P-O fit, which might be supported by insightful and actionable recommendations.

Second, from a methodological perspective, incorporating an algorithm-based methodology presents a novice multi-disciplinary approach to the human resources arena as a whole and, more specifically, to people analytics.

### Conclusions

The growing complexity of global work poses key challenges on the human resources function (Rosenzweig & Nohria, 1994; Tzafirir et al., 2004; Wang et al., 2009). As work in many global organizations becomes increasingly resource consuming and complex, a good fit between the employee and the job, like a good fit between the employee and the organization, becomes more important than ever. This study is an example of how an innovative and robust methodological approach based on HR analytics tools deepens our understanding of social and organizational phenomena, thus increasing organizational ROI. Perhaps the most striking discovery of our research is that in contrast to what was previously assumed, turnover is a non-linear and disruptive phenomena.

Existing frameworks for understanding the nature of turnover remain limited for various reasons. First, the concept and related models

focus on limited constructs, which limit the fit discussion. Second, turnover has not explored from a deeper perspective to determine its nature. We propose that the disruptive nature turnover that we extracted from our data through the HR analytics pattern detection methodology begins to address some of these limitations.

### References

- Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of occupational and organizational psychology*, 63(1), 1-18.
- Argandoña, A. (2003). Fostering values in organizations. *Journal of Business Ethics*, 45(1), 15-28
- Bamberger, P., & Ang, S. (2016). The quantitative discovery: What is it and how to get it published. *Academy of Management Discoveries*, 2(1), 1-6.
- Boon, C., & Biron, M. (2016). Temporal issues in person-organization fit, person-job fit and turnover: The role of leader-member exchange. *Human Relations*, 69(12), 2177-2200.
- Cable DM and Edwards JR (2004) Complementary and supplementary fit: A theoretical and empirical integration. *Journal of Applied Psychology*, 89(5): 822-834
- Campion, M. A., Fink, A. A., Rugeberg, B. J., Carr, L., Phillips, G. M., Odman, R. B. (2011), Doing competencies well: best practices in competency modeling, *Personnel Psychology*, 64, 225-262
- Cappelli, P. (2008). Talent management for the twenty-first century. *Harvard Business Review*, 86(3), 74.
- Chalutz Ben-Gal, (2017), An ROI-based review of HR Analytics: Practical implementation tools, Forthcoming.
- Chalutz Ben-Gal, H. & Tzafirir, S. S. (2011), Consultant-Client Relationship: one of the secrets to effective organizational change? *Journal of Organizational Change Management*, 24 (5), 662-679
- Chatman, J. A. (1989). Improving interactional organizational research: A model of person-organization fit. *Academy of management Review*, 14(3), 333-349.

- Clugston, M. (2000). The mediating effects of multidimensional commitment on job satisfaction and intent to leave. *Journal of organizational behavior*, 477-486.
- de Oliveira, L. B., Cavazotte, F., & Alan Dunzer, R. (2017). The interactive effects of organizational and leadership career management support on job satisfaction and turnover intention. *The International Journal of Human Resource Management*, 1-21.
- Devos, A., Dehauw, S., Willemse, I. (2011), Competency development in organizations: building an integrative model through a qualitative study, Vlerick Leuven Gent Working Paper Series 2011/01, 1-38
- Dolan, S. L. & Garcia, S. (2002), Managing by values: cultural redesign for strategic organizational change at the dawn of the twenty-first century, *The Journal of Management Development*, 21 (2), 101-117
- Herscovitch, L., & Meyer, J. P. (2002). Commitment to organizational change: extension of a three-component model. *Journal of Applied Psychology*, 87, 474-487.
- Holtom, B. C., & Burch, T. C. (2016). A model of turnover-based disruption in customer services. *Human Resource Management Review*, 26(1), 25-36.
- Holtom, B., Goldberg, C. B., Allen, D. G., & Clark, M. A. (2017). How today's shocks predict tomorrow's leaving. *Journal of Business and Psychology*, 32(1), 59-71.
- Krausert, A. (2016). HR differentiation between professional and managerial employees: Broadening and integrating theoretical perspectives. *Human Resource Management Review*.
- Kristof AL (1996) Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology* 49(1): 1-49.
- Lau, P. Y. Y., McLean, G. N., Hsu, Y. C., & Lien, B. Y. H. (2017). Learning organization, organizational culture, and affective commitment in Malaysia: A person-organization fit theory. *Human Resource Development International*, 20(2), 159-179.
- Lawler, E. E. (1993, July). From job-based to competency-based organizations (Working Paper). The Center for Effective Organizations, The Marshall School of Business, University of Southern California.
- Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR Analytics. *The International Journal of Human Resource Management*, 28(1), 3-26.
- Meyer, J. P., & Parfyonova, N. M. (2010). Normative commitment in the workplace: A theoretical analysis and re-conceptualization. *Human resource management review*, 20(4), 283-294.
- Ng, T. W. (2015). The incremental validity of organizational commitment, organizational trust, and organizational identification. *Journal of Vocational Behavior*, 88, 154-163.
- Rosenzweig, P.M., & Nohria, N. (1994), Influences on human resource management practices in multinational corporations." *Journal of International Business Studies*, 25, 229-251.
- Schultz, T. W. (1961), Investment in human capital, *American Economic Review*, 51 (1), 1-17
- Schwartz, S. H. & Bilsky, W. (1990), Toward a theory of the universal content and structure of values: extensions and cross-cultural replications, *Journal of Personality and Social Psychology*, 58 (5), 878-891
- Tett, R. P., & Meyer, J. P. (1993). Job satisfaction, organizational commitment, turnover intention, and turnover: path analyses based on meta-analytic findings. *Personnel Psychology*, 46(2), 259-293.
- Tzafrir, S.S., Baruch, Y., & Dolan, S.L. (2004), The consequences of emerging HRM practices for employees' trust in their managers. *Personnel Review*, 33 (6), 628-647.
- Tzafrir, S. S., Chalutz Ben-Gal, H., Dolan, S. L. (2012), Exploring the etiology of positive stakeholder behavior in global downsizing, in Cooper C. L., Pandey A., Quick J. C. (eds.) *Downsizing - Is less still more?* Chapter 13, Cambridge University Press