



FINAL PRESENTATION

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REDUCING ATTRITION THROUGH DATA: A TARGETED HR STRATEGY

Targeted Insights to Reduce Attrition

Presented by Quang Giang



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Employee attrition is highly concentrated in a few specific groups. By addressing three key drivers — **Overtime, Career Stage, and Compensation** — we can target over 70% of turnover risk.

Group-level summary of key insights

OVERTIME

- Employees working overtime face an attrition rate of 30.5% — nearly 3x that of those with no overtime.
- Indicates burnout and lack of work-life balance.

JUNIOR

- Employees at Junior Level have an attrition rate of 26.3%, compared to 10.1% for others.
- Signals unclear growth path, lack of recognition, and career stagnation.

COMPENSATION

- Employees earning < 2,696 have a 31.3% attrition rate, vs. 12.3% for those above.
- Those without stock options are 2.5x more likely to leave.
- Married employees without long-term incentives (like stock options) are most affected.

Strategic Implication

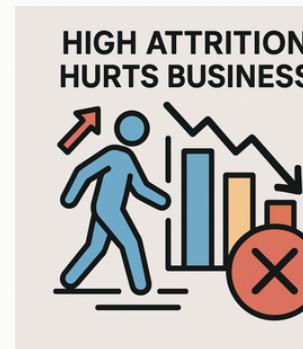
A **segmented retention strategy** is essential — combining structured pay progression, early development support, and workload management to proactively retain at-risk employees.

Reducing attrition is both a business need and a strategic advantage. With data-driven insights, HR can take proactive, targeted actions instead of reacting passively.

Business Context

Problem: High Attrition Hurts Business

- ↓ Increased recruitment & onboarding costs
- ↓ Lost productivity & team disruption
- ↓ Erosion of internal knowledge & morale

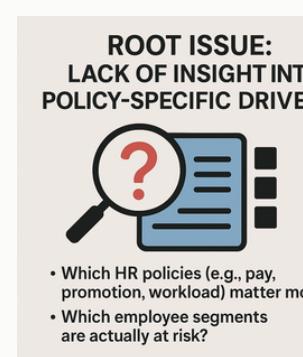


Common Misconception: "One-size-fits-all" Solutions

- Blanket pay raises
- Generic engagement campaigns
- Standard retention bonuses
 - Often miss the real causes
 - Waste resources without addressing root problems

Root Issue: Lack of Insight into Policy-Specific Drivers

- Which HR policies (e.g., pay, promotion, workload) matter most?
- Which employee segments are actually at risk?



Project Objective

This project aims to analyze the IBM HR dataset to:

- Identify which HR policy areas (e.g., compensation, promotion, work-life balance) are most associated with attrition.
- Quantify the influence of each policy-related factor on the likelihood of employee exit.
- Segment the workforce to uncover which groups are most vulnerable based on these factors.
- Recommend targeted, practical HR policy adjustments to reduce attrition where it matters most.



Problem Statement: To identify which specific HR policy areas are most associated with employee turnover and propose targeted, data-driven policy improvements to reduce attrition risk.

A hypothesis-driven, structured analysis using the Bullet Problem Solving method was conducted to identify key HR policy drivers of attrition and translate them into actionable levers.

Problem-Solving Logic

The project began with a broad hypothesis space across HR policy areas, which was narrowed down through data exploration and statistical validation.

Initial Hypothesis Exploration:

HR Policy Area	Hypotheses Explored
Compensation & Rewards	Monthly Income, Percent Salary Hike, Stock Option Level
Career Development & Advancement	Job Level, Years Since Last Promotion, Training Times Last Year, Years In Current Role
Work-Life Balance & Flexibility	Over Time, Distance From Home, Business Travel, Work Life Balance
Performance Management	Job Involvement, Job Satisfaction, Performance Rating
Employee Engagement	Relationship Satisfaction, Environment Satisfaction
Recruitment & Onboarding	Num Companies Worked, Years At Company, Years With Current Manager

Final Analytical Flow

1. Problem Framing & Hypothesis Breakdown

- Business questions were decomposed into testable sub-hypotheses using Bullet Problem Solving
- Focused on identifying controllable, policy-relevant drivers of attrition

2. Exploratory Data Analysis (EDA)

- Reviewed distribution of variables, detected patterns and correlations
- Created meaningful groupings (e.g., junior vs others, salary thresholds)

3. Data Cleaning & Preparation

- Removed duplicates, handled missing data
- Defined clear subgroups to support hypothesis testing

4. Statistical Testing

- Applied Chi-squared and Fisher's Exact Test to confirm associations
- Verified that relationships were statistically significant ($p < 0.05$)

5. Insight Synthesis

- Identified 3 key policy-linked drivers:
 - OverTime
 - Lack of career growth (junior roles with no recent promotion)
 - Low income
- Mapped each to tailored, segment-specific HR recommendations

The analysis reveals three key HR policy-related drivers that significantly increase employee attrition: excessive workload, career stagnation, and uncompetitive compensation.

What Drives Attrition Most?

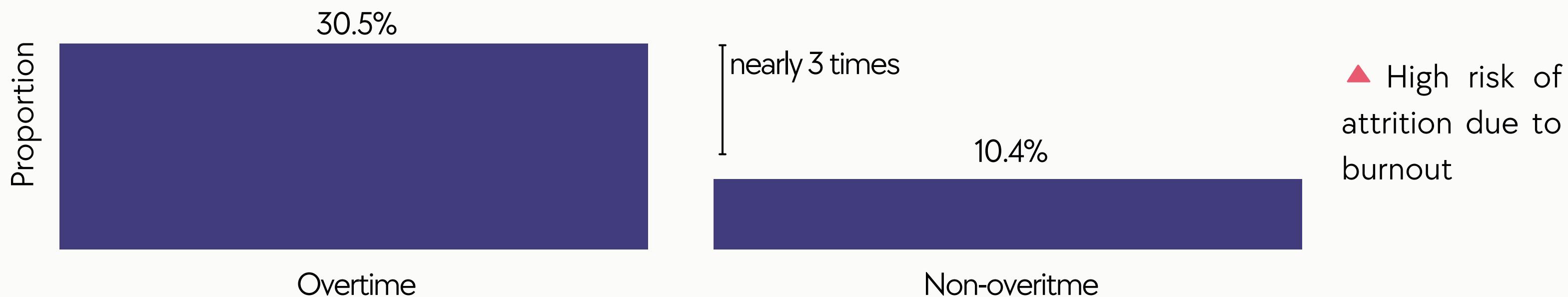
	OVERTIME	JUNIOR	COMPENSATION
Priority	Highest	High	Moderate
Root Cause:	Employees are frequently required to work overtime	Early-career employees lack visibility and growth path	Low salary and absence of stock options in key groups
Most Affected Segment	Employees working OT	Junior employees	<ul style="list-style-type: none">- Junior employees with low income and no promotion- Married employees without stock options
Why It Matters	Chronic overwork leads to burnout and poor work-life balance, increasing disengagement	Without clear development opportunities, junior talent is more likely to leave early	Compensation mismatches cause disengagement when financial rewards don't reflect effort or tenure

Employees required to work overtime are nearly 3 times more likely to leave than those who don't – making overtime the most immediate and policy-controllable driver of attrition.

Overtime Significantly Increases Attrition Risk

Employees Working Overtime Are Nearly 3x More Likely to Leave

Overtime workers have a 30.5% attrition rate, compared to 10.4% for those with no overtime.



What This Means

- Persistent overtime often reflects under-resourced teams and inefficient workload planning
- This leads to burnout, work-life imbalance, and reduced long-term engagement
- Without adequate support or structure, employees may feel unsupported, pushing them to leave

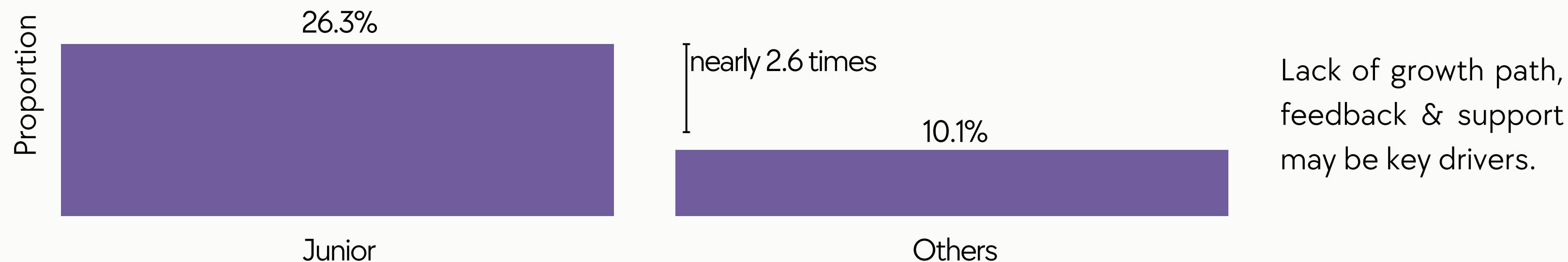
- To address this, the organization should focus on:
- Setting overtime limits to prevent chronic overwork
 - Redistributing workloads or hiring short-term support during peak periods
 - Equipping managers with time management tools to reduce dependency on overtime

Junior employees are significantly more likely to leave due to unclear growth and lack of early support.

Junior Employees are Vulnerable to Attrition

Junior Employees Are 2.6x More Likely to Leave the Company

Junior workers have a 26.3% attrition rate, compared to 10.1% for those with no overtime.



What This Means

- Junior employees are more likely to leave due to unclear career paths, limited guidance, and slow recognition
- Lack of growth visibility and early feedback creates a sense of stagnation and disengagement
- These early-stage employees need structure, support, and quicker progress signals to stay motivated

To retain junior talent, HR policies should:

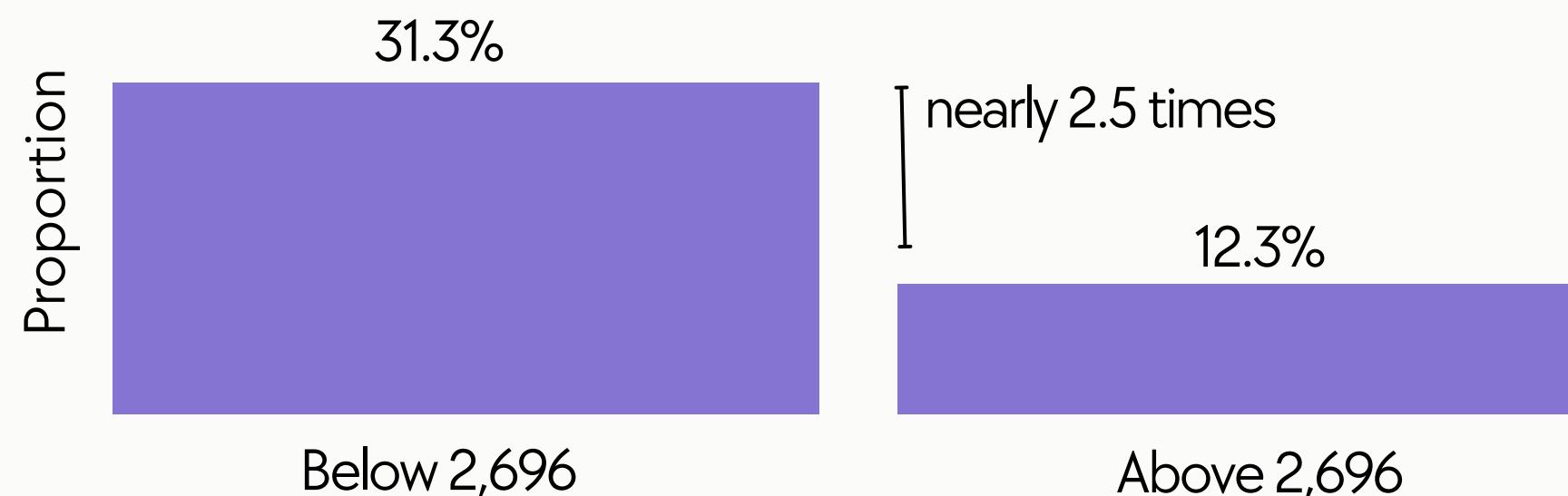
- Define career development paths clearly from onboarding onward
- Match juniors with mentors or buddies to increase connection and belonging
- Introduce more frequent performance reviews to create earlier promotion and feedback opportunities

Employees earning less than 2,696 are significantly more likely to leave, especially early-career staff without promotion.

Low Monthly Income

Employees Earning Less Than 2,696 Are 2.5x More Likely to Leave

Employees earning below 2,696 have a 31.3% attrition rate, compared to 12.3% for those above.



Junior employees with limited experience and no recent promotion face the highest attrition risk when income is low

Group	Attrition Rate (Low Income)	Attrition Rate (High Income)
Junior < 3Y in Role & Promotion	36,8%	21,4%
Others	17,6%	11,1%

What This Means

- Junior employees are more likely to leave when low income is combined with limited experience and no recent promotion.
- At this early stage, income is more than just money – it's seen as a reflection of growth, value, and progress.
- When salary stagnates while effort builds up, it creates a strong sense of being stuck and underappreciated.

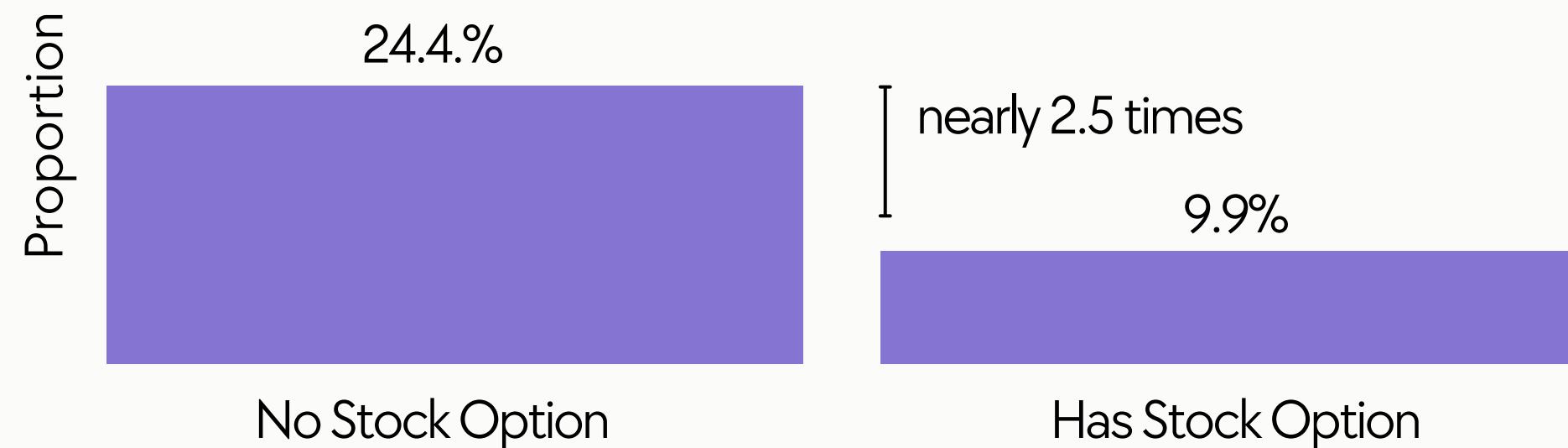
- To reduce income-related attrition, HR policies should:
- Design structured salary growth paths to reinforce early-career progression
 - Offer milestone-based retention bonuses to reward loyalty and reduce early exits
 - Align compensation with role and contribution, especially for tenured employees

The absence of stock option benefits is strongly linked to higher attrition, particularly among married employees who value long-term financial security.

Stock Option Benefits

Employees Without Stock Options Are 2.5x More Likely to Leave

Employees without stock options have a 24.4% attrition rate, compared to 9.9% for those above.



What This Means

- Stock options reflect long-term commitment, appealing to married employees seeking stability and family security.
- Without them, married employees may see limited future value and become more open to external offers.
- Single employees value growth, autonomy, and lifestyle fit over financial perks like equity.

Junior employees with limited experience and no recent promotion face the highest attrition risk when income is low

Group	Attrition Rate (No SO)	Attrition Rate (Has OP)	Statistically Significant?
Married	10,2%	20,3%	Yes (p=0.0014)
Single & Divorced	9,4%	25,7%	No (p>0.05)

- To reduce stock-option-related attrition, HR policies should:
- Offer stock options to married employees after a defined tenure to reinforce long-term loyalty
 - Clearly communicate the value and future benefits of stock ownership
 - Provide flexible, personalized benefits for single employees to maintain engagement through relevance

Reducing attrition requires segment-specific HR interventions tailored to the unique needs, risks, and motivations of each employee group.

Targeted Actions for High-Risk Employee Groups

Segment	Attrition Risk / Root Cause	Targeted Solutions	Expected Outcome
Employees Working Overtime	▲ 30.5% attrition rate Burnout, work-life imbalance	<ul style="list-style-type: none"> - Set monthly overtime limits - Reallocate workload or add temp staff - Train in time and productivity management 	Reduce burnout Improve work-life balance Lower short-term attrition
Junior Employees	▲ 26.3% attrition rate Lack of visibility & early growth	<ul style="list-style-type: none"> - Define clear career paths - Assign mentors or buddies - Increase performance review frequency (e.g., every 6 months) 	Boost engagement Encourage early promotion Improve belonging
Low-Income Employees	📌 Feel undervalued, especially early-career	a. Junior <3 years in role & no promotion: <ul style="list-style-type: none"> - Structured salary increases- Milestone-based bonuses (1, 2, 3 years) - Upskilling for promotion readiness b. Others: <ul style="list-style-type: none"> - Market-based salary review - Align pay with actual responsibilities 	Signal career progression Ensure fair pay Improve financial security
Employees Without Stock Options	▲ 24.4% attrition rate No long-term financial incentive	a. Married: <ul style="list-style-type: none"> - Stock options after 1-year tenure - Clarify long-term value of ownership b. Single: <ul style="list-style-type: none"> - Learning/personal development budget - Flexible work or extra leave 	Retain family-focused staff Support self-driven growth Enhance satisfaction with flexibility

Retention risks are concentrated in specific employee segments and lifecycle stages – targeted interventions at the right time can significantly reduce attrition.

Employee Lifecycle Heatmap: Targeted Retention Strategy

●: Action ●: Monitor / Enable

Risk Segment / Stage	Onboarding 0–6M	6M–1Y Milestone	1–2Y Growth Phase	>2Y Maturity & Stabilization
1. Overtime Workers	● Monitor workload in early ramp-up	● Set OT limits ● Time manage training	● Reallocate workload ● Add temporary staff during peak load	● Promote wellness & work-life balance practices
2. Junior Employees (<3Y in role & promotion)	● Onboard with career path clarity	● Implement buddy/mentoring system	● Frequent performance reviews ● Promotion readiness coaching	● Offer internal mobility opportunities
3.1. Junior + Income <2,696	● Offer market-aligned base salary	● Structured salary plan intro	● Milestone bonuses at 1, 2, 3Y ● Training for promotion readiness	● Time-in-role salary raise reinforcement
3.2. Other Employees + Income <2,696	● Salary check after onboarding	● Review salary fairness vs. contribution	● Market benchmarking review	● Performance-aligned raise adjustments
4.1. Married Employees Without Stock Options	● Identify marital status (if declared)	● Communicate LT benefits strategy	● Offer stock options after 1Y ● Communicate eligibility/value	● Reinforce equity benefit in retention efforts
4.2. Single & Divorced Without Stock Options	● Flexible work environment onboarding	● Offer development fund intro	● Provide personal dev. budgets ● Optional leave/flex time	● Support career planning or lifestyle benefits

Targeted HR interventions are expected to drive measurable improvements in attrition, engagement, and internal mobility, especially among high-risk segments.

Overall Outcome Goals

Outcome Area	Target Outcome	Clarification / Why It Matters
Attrition Rate	▼ Reduce overall attrition by 5–10% annually	Lower voluntary turnover reflects improved HR policies and saves cost from frequent backfilling.
Engagement	▲ Improve employee satisfaction & organizational commitment	Indicates that employees feel more valued, supported, and aligned with company goals.
Internal Mobility	▲ Increase promotion readiness and career growth among junior staff	Shows that junior employees are receiving the development needed to grow within the company.
Retention Cost	▼ Decrease cost of replacing early leavers (within 1–2 years)	Reducing short-term exits saves onboarding, training, and productivity ramp-up costs.

Targeted HR interventions across key risk segments are expected to significantly reduce attrition by addressing root behavioral drivers.

Expected Impact by Key Driver

Key Driver	Targeted Solution	Expected Behavioral Impact	Metrics to Track
1. Overtime Workload	Limit OT hours, redistribute workloads, train in time management	Reduce burnout and improve work-life balance → increase short-term retention	Attrition rate in OT segments ↓ OT hours per dept ↓
2. Junior Level Employees	Define career path, assign mentors, frequent reviews	Increase clarity, support, and perceived growth → reduce early-stage resignation	1Y & 2Y retention ↑ Promotion readiness ↑
3.1. Low Income – Junior & No Promotion	Salary progression, retention bonuses, upskilling for promotion	Increase perceived fairness and progress → reduce disengagement in early-stage employees	Attrition in junior-low-income ↓ Internal mobility ↑
3.2. Low Income – Other Employees	Salary market benchmarking and performance-based reviews	Reinforce fairness and recognition for contribution → retain experienced staff	Mid-tenure attrition ↓ Pay fairness perception ↑
4.1. No Stock Option – Married Employees	Introduce stock options after 1Y, communicate long-term financial benefits	Reinforce long-term attachment and future vision for family-oriented employees	Retention after 2Y ↑ Equity plan adoption ↑
4.2. No Stock Option – Single Employees	Provide development budget, flexible work options	Offer autonomy, learning, and personal growth → increase satisfaction among single staff	Engagement ↑ Use of learning benefits ↑

The project provides strong diagnostic insights but is limited by synthetic data and lack of prediction – future steps should focus on automation, scalability, and actionability.

What This Project Doesn't Cover (Yet)

Limitation	Description
Synthetic dataset	IBM dataset is artificially generated and lacks real organizational context. Some behavioral or cultural nuances may be missing.
No time-based patterns	Absence of time-series data (e.g., hire/exit dates) prevents trend detection or seasonality analysis.
Internal-only income data	Salary insights are based on internal distribution only – no comparison to market or industry standards.
No predictive modeling	The analysis is diagnostic (explains "what" and "why") but not yet predictive (no "who next").

What Could Be Done Next

Next Step	Purpose
Apply predictive models (e.g., attrition risk scoring)	Move from insight to action by identifying high-risk individuals for early intervention.
Create interactive dashboards	Enable ongoing monitoring and communication of KPIs to stakeholders via tools like Tableau or Power BI.
Automate analytics workflow	Turn the EDA and reporting into a reproducible process using RMarkdown or Python.
Validate with other datasets	Enhance credibility by testing findings on external or industry datasets for broader applicability.

Strategic, targeted HR interventions can meaningfully reduce employee attrition – especially when aligned with segment-specific needs and data-driven insights.

ANALYSIS INSIGHTS

Attrition is concentrated in key segments:
Overtime workers, Junior employees, Low
compensation & No long-term rewards



UNDERLYING ROOT CAUSES DIFFER BY GROUP

- Burnout (Overtime)
- Career stagnation (Junior)
- Misaligned pay or benefits (Compensation)



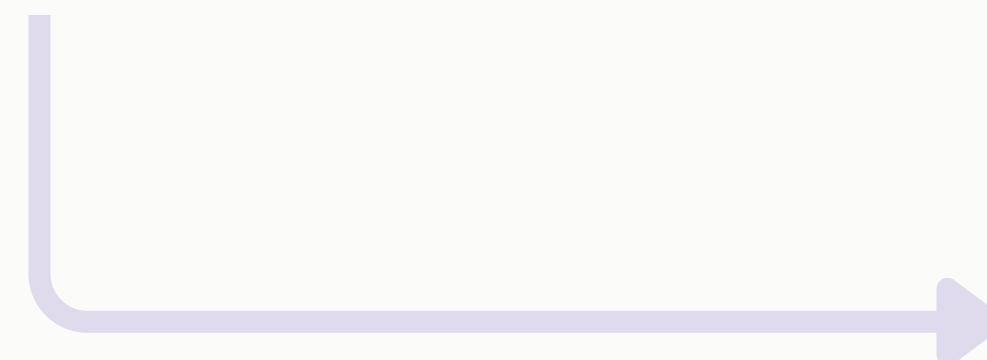
NEED FOR SEGMENT-SPECIFIC INTERVENTIONS

One-size-fits-all solutions waste resources
Tailored actions improve both retention &
morale



DATA-DRIVEN SOLUTIONS ARE AVAILABLE

- Lifecycle-aligned interventions
- Practical & evidence-based
- Targeted at root causes



NEXT STEPS TO ENABLE IMPACT AT SCALE

- Prioritize & implement targeted HR solutions
- Build predictive dashboards & automation
- Validate with real-world testing & continuous feedback



Supporting Deliverables

Document	Format	Purpose	Link
1. Problem Definition	PDF	Defines business problem, context, and key questions guiding the project.	Link
2. Hypothesis Generation	PDF	Presents structured assumptions behind attrition causes and drivers.	Link
3. Final Solution Summary	PDF	A detailed narrative of insights, segmentation logic, recommendations, and HR strategies.	Link
4. EDA & Analysis (Interactive)	HTML	Explores data patterns with visuals, statistical tests, and summary tables.	Download to Read
5. EDA & Analysis (Source Code)	Rmd	Reproducible RMarkdown notebook including data cleaning, analysis logic, and visualization code.	Link