

Management and Organizational Practices Survey - Colombia 2017-2018

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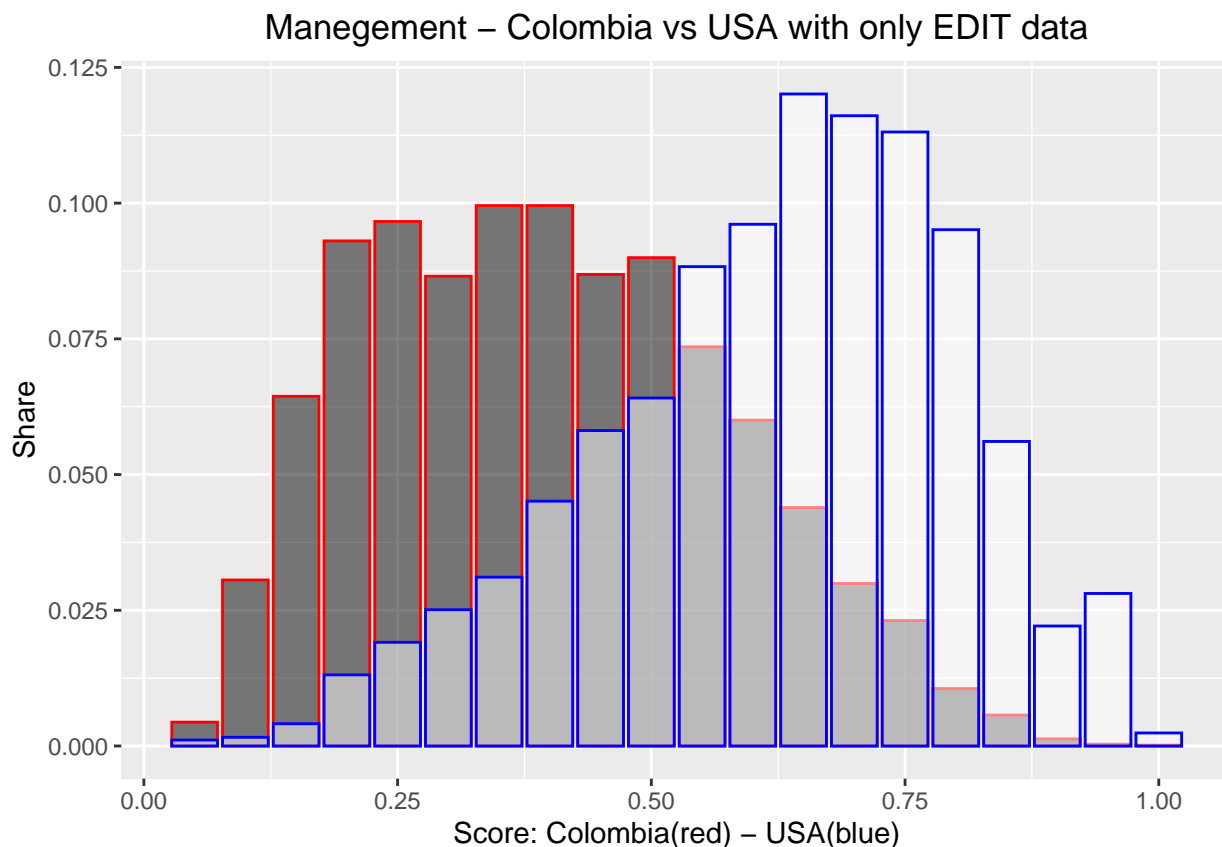
Let's analyze Management and Organizational Practices Survey - MOPS questions. The 16 questions traditionally analyzed are: non-incentives (MOPS questions 1–8: monitoring and targets) and incentives (MOPS questions 9–16: bonus, promotion, and reassignment/dismissal practices). The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale following Bloom (2019). The EDIT data was recoded from categorical variables into a numerical variables in order to get a score.

Table 1: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Management (1-16)	6,034	0.376	0.176	0.026	0.231	0.504	0.958
No Incentives (1-8)	6,034	0.555	0.198	0.056	0.402	0.701	1.000
Incentives (9-16)	6,034	0.222	0.191	0.000	0.071	0.357	0.952
Size(Firm employment)	6,034	125.502	254.973	0	18	117	4,181
Exporters	6,034	0.328	0.470	0	0	1	1
Multiplant	6,034	0.044	0.206	0	0	0	1

The next histogram shows the distribution for management score (16 questions). As you can see, the distribution is skewed to the left, where the total number of observations is 7,529. This histogram includes all observations with at least 11 non-missing responses to management questions.

We use the Bloom (2019) methodology: “Questions 3, 4 and 5 are scored at 0 if missing, which typically arises from firms reporting “no performance indicators” to question 2 and skipping to question 6. The rationale for this is that firms with no performance indicators have no managerial or nonmanagerial review of performance indicators, and have no performance display boards. For questions with multiple possible responses (those with “mark all that apply”) the average value was used”.



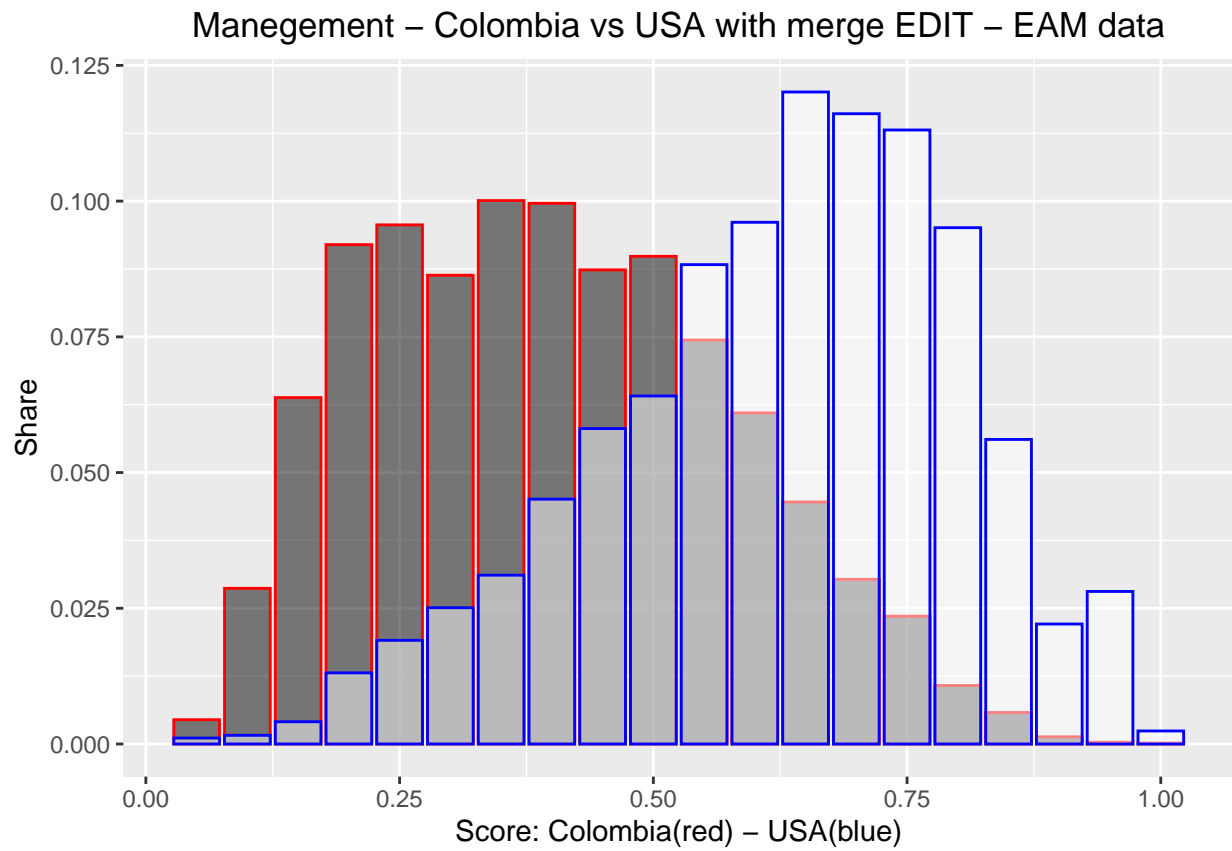
The Colombian average management score (16 questions) is 0.367 meanwhile the U.S score is 0.615. The Non-incentive management score (1-8) is 0.474 (U.S:0.643) and incentives average (9-16) is 0.232 (U.S:0.583).

Annual Manufacturing Survey

The next table shows the number of observations for each database and our estimates use the merge EDIT-EAM.

Table 2: Databases

Database	n
EDIT 1:All observations	7,529
EDIT 2:At least 11 non-missing values	6,148
EAM 1:All observations	7,911
EAM 2:Collapsed data	7,256
Merge EDIT 2 - EAM 2	6,034



The plot indicates a positive relationship among the number of employees and our management score:

Firm size rises with Management –Non-Linear fit

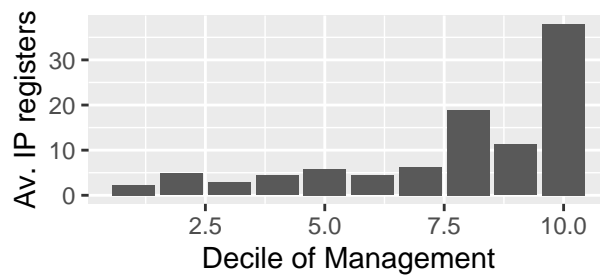
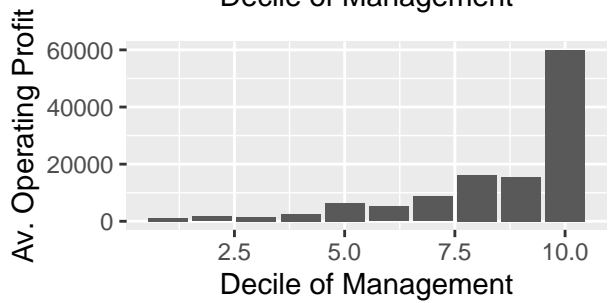
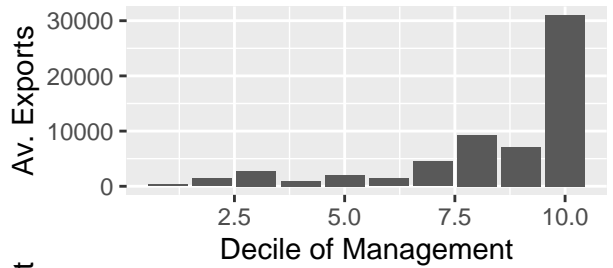
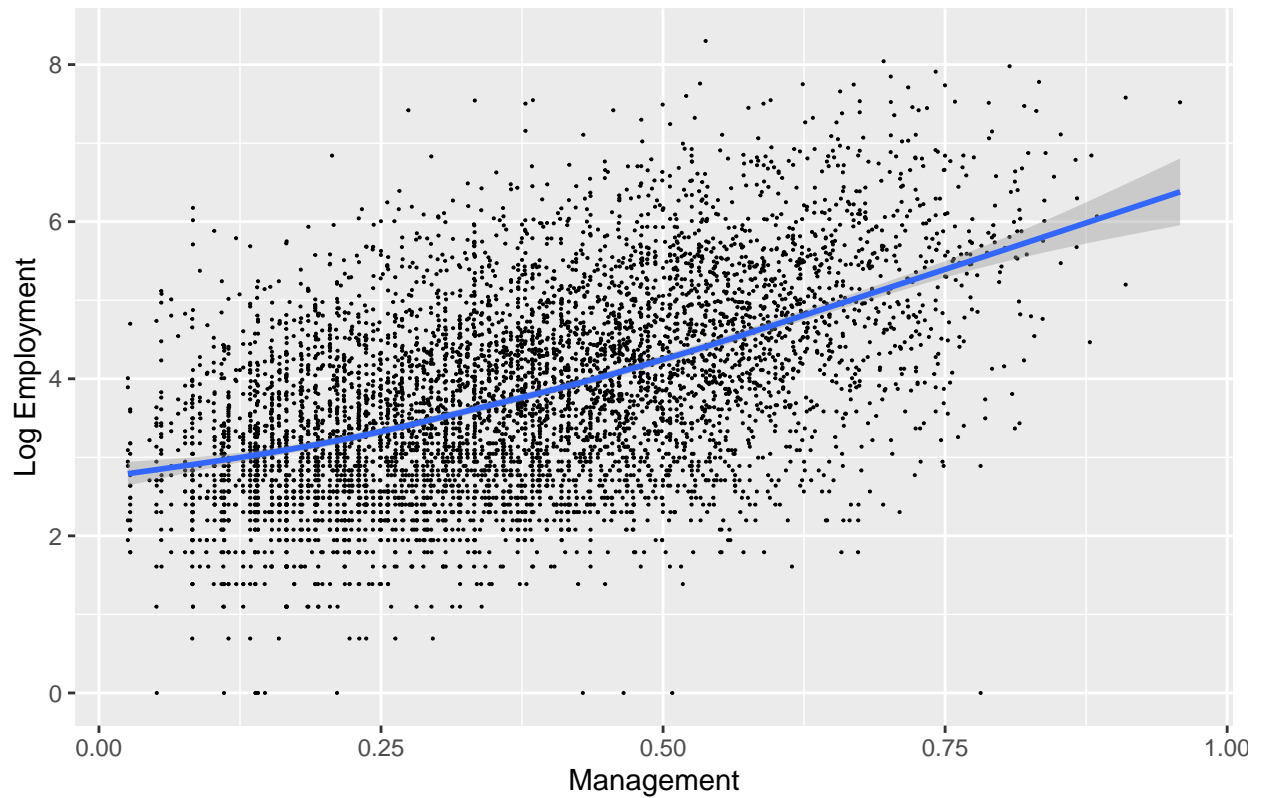


Table 3: Firm Management Scores and Performance

	Ln(Output/Emp)			Ln(Sales/Emp)			Profit/Sales		
	1	2	3	4	5	6	7	8	9
Management	0.33*** (0.03)	0.34*** (0.03)	0.36*** (0.03)	0.33*** (0.03)	0.34*** (0.03)	0.36*** (0.03)	0.03 (0.05)	0.03 (0.05)	0.03 (0.05)
Ln(Cap/Emp)	0.05*** (0.00)	0.05*** (0.00)	0.05*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Ln(Input/Emp)	0.68*** (0.01)	0.68*** (0.00)	0.69*** (0.00)	0.67*** (0.01)	0.67*** (0.00)	0.68*** (0.00)	0.12*** (0.01)	0.10*** (0.01)	0.10*** (0.01)
Ln(Employment)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Degree	0.15** (0.05)	0.40*** (0.05)	0.38*** (0.05)	0.20*** (0.05)	0.47*** (0.05)	0.45*** (0.05)	-0.06 (0.08)	-0.17* (0.08)	-0.16* (0.08)
R ²	0.81	0.84	0.85	0.81	0.84	0.85	0.04	0.03	0.03
Adj. R ²	0.81	0.84	0.85	0.80	0.84	0.85	0.02	0.02	0.03
Num. obs.	5992	5992	5992	5992	5992	5992	5992	5992	5992

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

OLS coefficients with standard errors in parentheses. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale. The sample is all EDIT observations with at least 11 non-missing responses to management questions and a successful match to EAM, which have positive value added, positive employment, and positive imputed capital. The columns 1-3 mean the models with Industry Fixed Effects, Location Fixed Effects and no Fixed Effects, respectively. This also applies for columns 4-6 and 7-9

Suppose that the firm production function is:

$$Y_i = A_i K_i^\alpha L_i^\beta I_i^\gamma e^{\delta M_i} e^{\mu X_i} + \varepsilon_i$$

Where Y_i : Production of firm i A_i : Total factor productivity (Excluding Management Practices) K_i : Fixed assets at final of 2018 L_i : Labor inputs: the total number of employees of firm i I_i : Intermediate inputs X_i : Vector of additional factors: the percent of staff with college degree M_i : Management score (1-16)

Dividing by labor and taking logs we can rewrite this in a form to estimate on the data:

$$\log \frac{Y_i}{L_i} = \alpha \log \frac{K_i}{L_i} + \gamma \log \frac{I_i}{L_i} + (\alpha + \beta + \gamma) \log L_i + \delta M_i + \mu X_i + u_i$$

We calculate this equation by estimating an OLS regression

Table 4: Firm Management Scores and Performance

	Log(VA/Emp)			(Profits/sales)			RD _i /Emp		
	1	2	3	4	5	6	7	8	9
Management	0.63*** (0.08)	0.69*** (0.08)	0.71*** (0.08)	0.05 (0.06)	0.06 (0.06)	0.06 (0.06)	0.31 (0.31)	0.25 (0.34)	0.25 (0.33)
Ln(Cap/Emp)	0.21*** (0.01)	0.24*** (0.01)	0.25*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.25*** (0.04)	0.31*** (0.04)	0.30*** (0.04)
Ln(Input/Emp)	0.18*** (0.01)	0.17*** (0.01)	0.18*** (0.01)	0.03*** (0.01)	0.02* (0.01)	0.02** (0.01)	-0.18*** (0.04)	-0.19*** (0.04)	-0.17*** (0.04)
Ln(Employment)	0.90*** (0.12)	1.39*** (0.11)	1.39*** (0.11)	0.07 (0.08)	-0.04 (0.08)	-0.03 (0.08)	1.83*** (0.53)	2.45*** (0.48)	2.41*** (0.47)
R ²	0.20	0.25	0.27	0.01	0.01	0.01	0.13	0.20	0.19
Adj. R ²	0.19	0.25	0.27	-0.01	0.00	0.01	-0.03	0.16	0.19
Num. obs.	5992	5992	5992	5992	5992	5992	583	583	583

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

OLS coefficients with standard errors in parentheses. The management score is the unweighted average of the score for each of the 16 questions, where each question is first normalized to be on a 0–1 scale. The sample is all EDIT observations with at least 11 non-missing responses to management questions and a successful match to EAM, which have positive value added, positive employment, and positive imputed capital. The columns 1–3 mean the models with Industry Fixed Effects, Location Fixed Effects and no Fixed Effects, respectively. This also applies for columns 4–6 and 7–9.

Table 5: Drivers of Productivity Variation

	Log(VA/Emp)			
	1	2	3	4
Management	2.562*** (0.257)	2.432*** (0.245)	2.384*** (0.247)	2.296*** (0.241)
RD _i		0.277*** (0.034)	0.307*** (0.040)	0.255*** (0.040)
ICT/Emp			-0.000 (0.000)	-0.000 (0.000)
Degree				2.389*** (0.414)
R ²	0.145	0.233	0.235	0.277
Adj. R ²	0.144	0.230	0.231	0.272
Num. obs.	584	584	584	584

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

OLS coefficients with standard errors in parentheses. Dependent variable is firm level log(Value Added/Employment). Right-hand-side variables are Management score, RD_i is measured as $\log(1 + \text{RD}_i \text{ intensity})$, where RD_i intensity is the total domestic Research, Development and innovation expenditure in 2018 divided by total domestic employment, ICT/Emp is investment per worker (1,000 × spending on information and communication technology hardware and software per employee), Degree is measured by the share of employees (managers and non-managers) with a college degree.

