Packaging products find their significance in almost all classes of consumer goods and products. The use of plastic and metal based packaging for beverages is highly dominant. However, there is a constant urge for development of eco-friendly packaging alternatives. The article focuses on characterizing an inflatable core assisted paper bottle molding process with respect to the obtained fiber distribution in the bottle. Distribution of paper fibers affect product characteristics such as thickness and mechanical strength of the bottle. Assessment of fiber orientation using structure tensor analysis is therefore performed. The results confirmed non-uniform fiber compaction in the paper bottle. This gives rise to non-conformities such as non-uniform thickness distribution. The approach discussed in the work can be utilized as a Non Destructive Testing technique to evaluate the quality of paper bottles.